Wildlife

IN AUSTRALIA

4/-

SECRETS OF THE TERMITE WORLD — BARRY MOORE
GIANT FLIGHTLESS BIRDS — GEORGE ROBBINS
THE GAMMON RANGES — H. D. W. SADDLER

REGISTERED AT THE G.P.O. BRISBANE FOR TRANSMISSION BY POST AS A PERIODICAL

THE COVER

The photograph on the cover is the work of Don Stephens. It is of a Dusky Brush-tail (*Trichosurus fuliginosis*) found in Tasmania and the islands of Bass Strait. Although the colour is very variable, from greyish through rufous and amber to an almost blackish-brown, the dusky tones predominate. These animals feed on the new shoots and leaves of the King William Pines.

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The Editors of *Wildlife* are constantly looking for articles and photographs on all aspects of nature and nature conservation in Australia. Please forward your articles to the Editor at G.P.O. Box 1173P, Brisbane.

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EDITORIAL

VOL. 2 No. 1 JUNE, 1964

SHOOTING

IT is reported that in Victoria landholders are being plagued by carloads of irresponsible shooters, who will cut fences, trespass without compunction, shoot at anything that moves, and in default of any other game turn their attention to telephone insulators and *No Shooting* notices. This particular kind of pest, of course, exists in all states, but where urban development is increasing and opportunities for more sensible recreation, or for training in the basic principles of sportsmanship, are decreasing, things are bound to get progressively worse.

At the same time, it is probably true to say that fewer and fewer responsible men are willing to offer themselves for the thankless job of voluntary rangerships, and proportionately very little finance is available for the employment of Government rangers and wildlife officers, compared with the great increase in other 'developmental' employment.

Different States, of course, have different conservation laws and methods of policing them. Moreover, the problems of conservation are different. In Queensland, for instance, the kangaroo-shooting industry (and a check must be kept on numbers in certain areas, since it has never been disputed by conservational authorities that kangaroo plagues do occur) means that almost anyone who is a good enough shot and has a few weeks to spare may join the ranks of professional kangaroo-shooters and set off on a paying holiday outback. Heavy-calibre hunting guns are freely available (the accident toll to under-age children of amateur kangaroo-shooters, and to amateur shooters themselves is particularly heavy).

Probably there are few country families who do not possess at least one gun. Probably, too, there are many people using guns freely, who have no idea of the boundaries — or even the existence — of sanctuary areas, since in Queensland and some other States little finance is available either for policing these, or for publicity notices, etc. And just as probably, plenty of amateur shooters have no knowledge either of the provisions of the Fauna Conservation Acts, or of the protected species.

Sooner or later, the question of licensing will have to be examined. Licensing of guns is already practised in some States; but since what is done with a gun, once licensed, is then of no importance, it is likely that a better method would be the licensing of hunters. If everyone who bought a gun had to show, first that he really required it, then that he was capable of using it responsibly, knowledgeable in the provisions of the game laws, and able to identify protected species, on penalty of losing his licence, this would be a step towards preventing the havoc among wildlife, the accidents to shooters and their families, and the annoyance to landowners, that prevail at present.

As to professional kangaroo-shooting, unpleasant as it is, it is at least a less destructive way of keeping kangaroos to manageable proportions, in those few areas where they are still a problem, than the wholesale poisoning campaigns that have been advocated in its stead; since from such campaigns such other wildlife would suffer decimation and possible extinction.

It is argued, plausibly enough, that professional shooters will never wipe out the kangaroo, since when numbers fall below a profitable level the shooters will move on. But it is after this that the amateur, unlicensed hunter takes over. Since he shoots 'for sport' and for trophies, and does not make a living from the job, he is far more dangerous to threatened species, as well as to the landowner's own property.

Is licensing of all hunters the answer? We would welcome your suggestions.

WILDLIFE

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Secrets of the Termite World

By Dr. Barry Moore

TERMITES, or 'white ants' as they are often called, are social insects, like the true ants, wasps and honey bees. They live together in immense colonies, sometimes numbering as many as a million individuals and persisting, as a unit, for a century or more. About one hundred and fifty species are now known from Australia and no matter where we care to look, in regions hot or cold, humid or dry, one or more of them will surely be at home. Some live concealed beneath the surface of the ground; others in living trees. Still others build enormous mounds, often exceeding fifteen feet in height, which form a well-known feature of the northern scene. The food of termites is mostly wood, living or dead according to their tastes, but a few species feed on grass and chaff — all frugal fare indeed for such industrious communities!

How is it that these small and delicate creatures can achieve so much in areas where larger animals, even man, would be hard pressed to eke a living — or, indeed, survive? The answer undoubtedly lies in the termites' highly organized mode of life. Apart from a few carefully regulated vents, their nests are sealed and insulated from the uncertainties of an outside clime. Here, life may continue uninterruptedly throughout the year. Here, too, all individuality is lost for the benefit of the colony as a whole. From the moment of hatching from the egg, the development of each and every termite is determined by communal needs. The youngster may become a soldier, whose only duty is defence — to protect foraging workers on the trail, or to rush into any breach and hold the enemy at bay, whilst workers hurriedly reseal the nest behind it, leaving it to its fate.

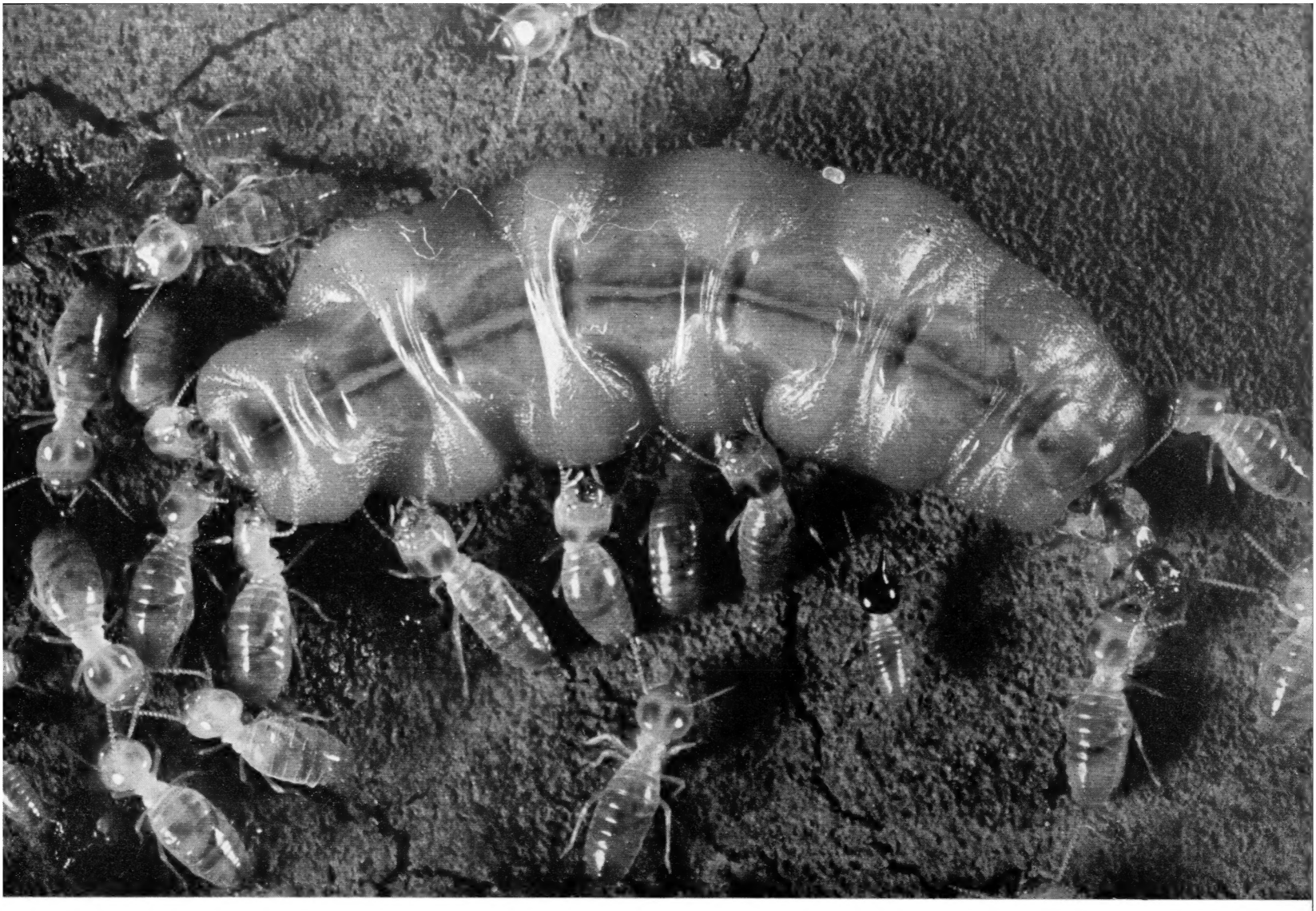


Photo: C.S.I.R.O.

Queen of Nasutitermes exitiosus attended by workers and soldiers.

It may become a king or queen, destined to leave the nest in nuptial flight, to found a new colony far away, or it may be just a humble worker, tied to one of the many duties of the nest until its days are done. When old or crippled, it will not be allowed to rest in peace, but will be devoured by its younger brethren, without a struggle, in order to conserve the food resources of the colony. Nothing is wasted; no time is lost. 'United we stand' is the basis of the termites' success.

The story of a termite colony starts with young kings and queens, which develop only at times of affluence in the nest — when food is plentiful and the weather mild. As befits their titles, these are the privileged caste. Unlike their lesser relatives, they possess eyes and wings and are allowed to spend a period, albeit brief, cavorting in the open air, before retiring for ever to the darkness underground. They leave the parent colony for a short flight, during a warm and humid spell, then shed their wings, associate in pairs, and seek a cavity underground. There the first eggs are laid and the hatchlings reared on food reserves stored in the parents' bodies. The first to reach maturity is usually a soldier, but workers soon follow to take over the duties of the nest. Little by little, the numbers expand and the never-ending task of construction and reconstruction carries on until, eventually, the colony reaches its full size, when it will produce its own young kings and queens and maintain its population around the million mark for many years. New workers and soldiers succeed the old and even the royal pair may be replaced, if they should die, until shortage of food or some other hazard brings about decline.

HOW is this unity maintained? How are the numbers of the different castes regulated in the nest? These are important questions that cannot yet be answered for sure, but it seems that the termite society depends upon an intricate system of chemical 'signal-substances', which govern the behaviour of all individuals throughout their lives. Some of these substances are passed from one termite to another during the licking and grooming operations which are a constant feature of every nest. The queen exudes a substance which is distributed in this way, and which inhibits the maturing of other

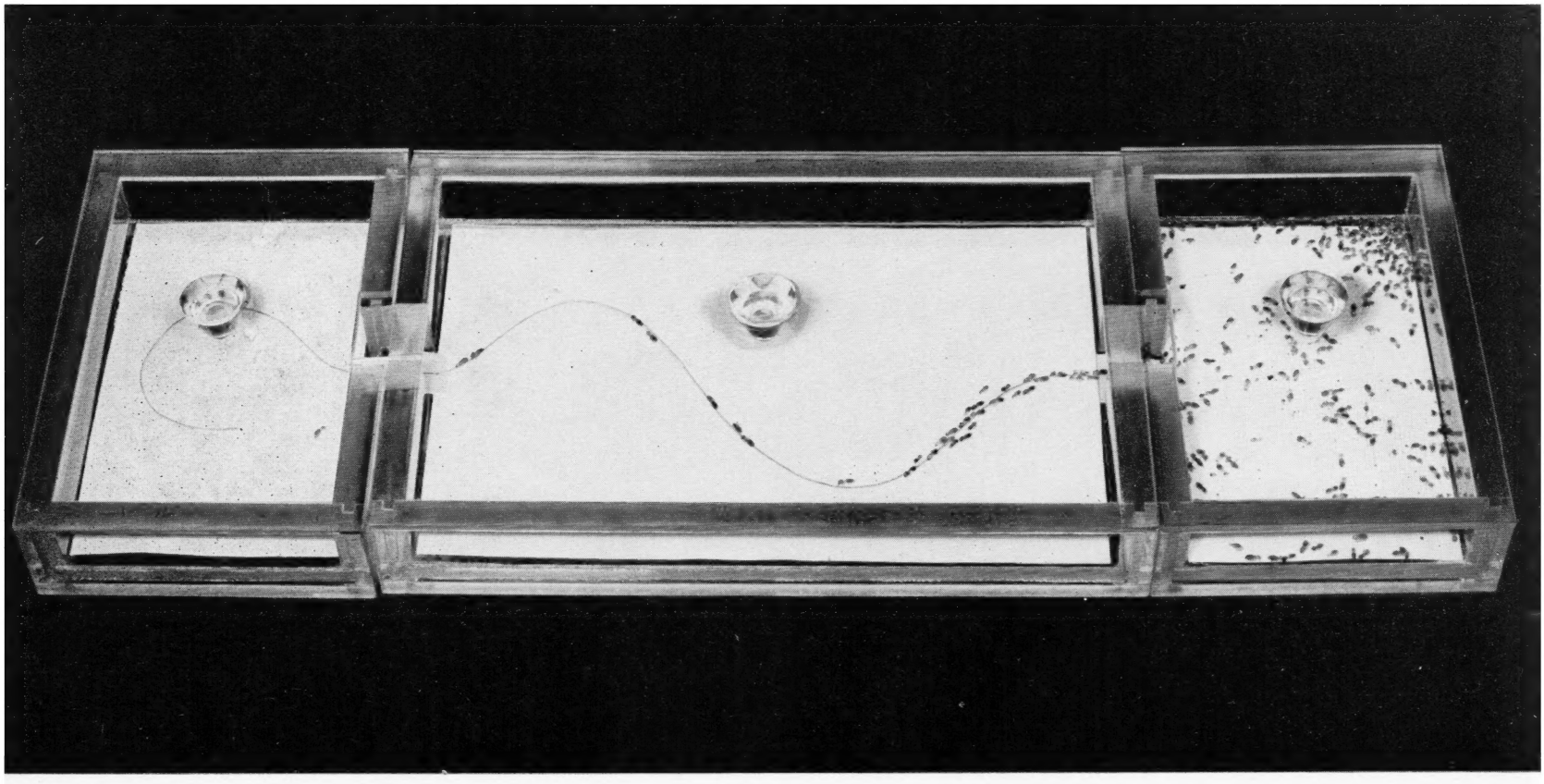


Photo: C.S.I.R.O.

Termites (Nasutitermes exitiosus) emerging from a laboratory stock-chamber to follow an artificial trail of scent-concentrate.

Mounds of Nasutitermes triodiae in the Northern Territory.

Photo: C.S.I.R.O.

queens in the colony, but when she begins to age, the supply of 'queen substance' fails and new queens are produced. Similarly, soldiers give off a 'soldier substance', which, if present in sufficient concentration, retards the further production of their caste. But if the number of soldiers is reduced, as a result, say, of an echidna raid upon the nest, then the supply of this signal substance declines and new soldiers are soon reared. But what if too many are produced — and the concentration of queen — or soldier — substance becomes too high? The situation is perceived at once by the workers, who devour the excess unwanted caste and thus restore the balance.

Then there is the question of communication between one termite and another. Workers and soldiers are quite blind, yet they recognize their kind with ease and appear perfectly able to find their way about. Here, science is on firmer ground, for these processes are known to be based upon an acute sense of smell. There is a special scent to advertise the presence of the king, another for the queen. Yet another serves to lay the trails which guide the foraging workers back to the safety of the mound. Soldiers emit alarm scent when they perceive, through air currents, a breach in the nest wall, thus bringing immediate reinforcements to the scene. Injury and sickness produce their own scents, too, resulting, as we have seen, in immediate consumption of the unfortunate individuals from whence they come.

THESE signal-scents are remarkably specific in their action. Each one has but a single message to deliver and that message is perceived only by termites of the kind that send it. To other animals, even other termite species, it means nothing and is ignored. It is, in fact, part of a complex code or chemical 'language' used by the termites to co-ordinate activities within the colony. If we are to solve the code, we need first to isolate each individual scent-substance and then to determine what kind of chemical it is. These are laborious processes, involving the extraction of large quantities of termites, with careful analysis and testing for activity at every stage, and such research is still largely in the early stages. However, we now have pure scent-trail substance of one species and we know roughly what its chemical structure is. It is an oily substance, quite odourless to the human nose, but to the termites in question it exerts an irresistible attraction. Artificial trails on paper, traced with a dilute solution of the scent in ether, are readily followed, back and forth, until the magic substance has dispersed. The amount of scent required is exceedingly small. It has been calculated that as much as would cover the head of a pin would lay a mile of trail — or a quarter of an ounce would stretch right round the world! However, though spectacular enough, this is by no means an exceptional performance, for we believe other signal substances will be found no less impressive in their specific ways.

Thus, we see that in the termite world, limitations of size and brain capacity have largely been overcome by the evolution of a simple code of chemical signals which, in turn, enable the development of large, long-lived and sophisticated societies without equal in all but the highest groups of living beings.

Nest of Coptotermes lactens, bisected to show the internal structure.

Photo: C.S.I.R.O.

LETTERS TO THE EDITOR

Dear Sir,

May I record my thanks to Mr. P. A. Bourke for the use of his excellent photographs which you used to illustrate my article in the December issue.

Because so many hours of patient work go into the making of even one good bird photograph, I think Mr. Bourke deserves rather more than the brief acknowledgement on page twenty-one.

Would it not be possible for the names of photographers and artists to be printed below their illustrations? This does not detract from the appearance of a page, and gives credit where it is due.

An alternative would be to acknowledge photographs and artists under the heading of an article with the byline.

Best wishes.

DOROTHY MAKIN,

Bundaberg.

This practice has now been followed. —Ed.

Dear Sir,

I was delighted to discover the existence of your magazine, having often wished such literature existed for people to communicate their interests and ideas on nature conservation.

As a member of the National Parks Association's 'Explorer' group such a magazine could be invaluable to me and the interests of N.P.A., in bringing to light areas worth preserving as parks or fauna reserves — for instance, the 'heronry' in the Lower Clarence area described in this issue.

1 enclose a cheque for 16/- annual subscription. I would like to enquire whether the two previous issues are available.

Yours faithfully,

R. MARTIN,

Sydney.

P.S.—You may be sure I will interest my friends and like-minded associates in your publication.

Dear Sir,

Congratulations on a very fine magazine, and if you are interested, I have all my old copies of the old *Wildlife,* which may be of some interest to see which were the most popular sections. I have a vast collection of colour slides of Australian spiders, and am interested in this subject, as I hope to carry on indefinitely with the slide collection and study of these interesting creatures, and if you could find room somewhere in your magazine to state that I want specimens from anywhere in Australia, I would appreciate it very much.

Yours sincerely,

RAMON MASCORD,

Sydney.

Dear Sir,

I have just read your very good article on the Golden Bower-bird and I agree with Mr. Bravery that this species is far from rare, having seen many of them in the scrubs of S.F.R. 194, Herberton. This reserve has three main patches: 1. 'Baldy Mountain,' the area where Jack Rockford noted the species; 2. Moomin; 3. 'The Crater' or Ringrose Park area (suggest anyone in the north use the former name).

Having surveyed these areas rather intensively, I can assure you that the likelihood of finding the species in the Crater area is very remote, but that the Moomin area abounds with them. This area has not seen any logging operations for several years — though sales are now in force — and this bird appears to prefer such areas naturally.

A recent article in the *Scientific American* on Bower-birds stated that all bower-birds tend to live in colonies and this certainly agrees with my observations, as there is quite an extensive colony in this area. The one located by Mr. Rochford is not quite as large, but similar. However, I'm quite sure they are safe, as there are few who know the exact areas and for obvious reasons I shall not divulge them, but would do so to those genuinely interested.

The bird, as you say, is far from shy, but like most a little patience is required. The best method I know to get close to them is to disturb the bower in some way. Usually there are several brightly coloured bottles, etc., in the bower and turning these over will produce a very annoyed bird promptly, who will use the most profane language regarding the genus *Homo sapiens.*

In this way quite good photos would be possible. The method works well for other species also, and the bird will stay for at least a quarter of an hour vigorously redesigning his bower.

For the female things are not as easy, but if you can locate one of the few king birds in the area the females are usually around — these birds have the 'Beatlemania' so to speak.

Hope this information may be of interest. As to the Cassowary, the Lake Eacham area is a much better spot to look, as it is for the Scrub Turkey. Fern Wrens are not that uncommon either, though the Glorious Wren will be sighted more commonly. In the scrub, however, the majority are heard and seldom sighted unless you just sit quietly in one spot. Leeches generally have other ideas, however.

Yours faithfully,

MAURICE R. PASSMORE,

Dalby.

Sir,

Your editorial on tourist roads (March, '64) is timely. Late last year I attended a public meeting at North Tamborine. The chairman—a member of a local Council—spoke with great enthusiasm of the possibility of a tourist road to link Binna-Burra with O'Reilly's. The only feasible route for such a road would be approximately short of the present walking track. That is, from Binna-Burra and along the ridge to Mt. Hobwee, then along the crest of the Macpherson Range to Bithongabel, then down the spur to O'Reilly's. Along these ridges is concentrated some of the most beautiful vegetation in the Lamington Park, notably the Antarctic Beeches on Mt. Wanungara and along the high crest of the New South Wales border.

When a road is built through timbered country on flat land there is a wide swathe of destruction. In precipitous country the zone of destruction is enormously multiplied. Cuttings and embankments and drainage and the dumping of spoil down steep hillsides and into mountain gullies, smothering vegetation—it is a grim picture. Following this comes the inevitable erosion—and this is an exceedingly high rainfall area.

I wrote at the time to the Chairman of the Council advancing my reasons for opposition, and received in reply a courteous letter from the Shire Clerk saying that the construction of the road was not likely for many years; the letter then went on '*. . . it is my Chairman's opinion that the benefit of the Park will not be realized until the two areas are linked together*'.

This is a perfectly clear statement of policy. When the time comes, National Park people will have to fight this proposal tooth and nail. The cost of such a road in terms of cash would be very high indeed. In terms of damage to one of the loveliest sections of the Lamington Park the cost would be incalculable.

R. S. PENNYCUICK,

Cremorne, N.S.W.

Brush up for Superb Lyrebird from the Stanthorpe district.

(The editor searched vainly for a photograph of the Albert Lyrebird. Does any reader have one?)

The Albert Lyrebird

By L. Nielsen

THE Albert Lyrebird (*Menura alberti*), one of the two species of lyrebirds inhabiting Australia, has a most restricted range. It occurs from the vicinity of Lismore in the north-east of New South Wales, northwards to the Tamborine Mountains and north-west to the Mistake Ranges in Southern Queensland. On a few occasions it has been recorded from the Blackall Range north of Brisbane, the most recent record being one of my own in August, 1959. However, the Albert Lyrebird of the Blackalls can be regarded as extremely rare and, if not already extinct, its days are surely numbered, as its habitat is gradually being lost to agriculture.

The Albert Lyrebird differs from its relative, the Superb Lyrebird, which is the more widely known of the two, in that its plumage is mostly rufous whereas that of the latter is grey. The tail of the male Albert Lyre-

bird is not so spectacular nor so large as that of the Superb.

Mound-building for the purpose of display, and mimicry, which are so characteristic in the southern bird, do not seem to be carried out by the Albert. Instead, the male renders his glorious melodies from a fallen log, a low tree bough or similar situations.

Its habitat also differs: whereas the Superb is content to dwell in the southern mountain forests, the Albert prefers the sub-tropical rainforests near the Queensland border.

Some ornithologists have stated that the vocal powers of the Albert Lyrebird do not match those of its relative, but John Gould, the 'Father of Australian Ornithology', considered the Albert to be a *better* mimic.

Be that as it may, its vocal powers are remarkable. One may listen to a bird pouring forth a rich continuity of calls and sounds 'borrowed' from avian neighbours of its rainforest home, in which it reproduces to perfection the soft twittering of the smaller birds and the loud notes of the larger birds. Even sounds produced through human agency can be 'repeated'. I remember when approaching a singing Lyrebird in the rainforest one afternoon, how the bird stopped and began imitating the sounds of sticks breaking beneath my feet! Truly it is remarkable.

THE Lyrebird is in full voice only during the winter months and the breeding season. For the remainder of the year it is practically silent and passes unnoticed, unless by chance the bird itself is seen.

As far as its breeding habits are concerned, the Albert closely resembles the Superb. The female alone builds the nest, incubates the egg and rears the young. While she is thus engaged, the male sings, dances and jealously defends his territory from trespassers of his own kind. The male does not feed the female while she is brooding, as do male birds of many other species. She leaves the nest each day at about nine o'clock in the morning and returns about three o'clock in the afternoon. It is interesting to note that the egg can be left for so long, as the temperature of those winter days in the mountain ranges is very low, even though the nest is lined with soft feathers plucked from the body of the female. (The feathers which are used to line the nest of the Albert Lyrebird have rufous tips, while those of the Superb are entirely grey.)

Although the Albert Lyrebird is restricted to a small area, it is hoped that its numbers do not decline very much, especially since the National Parks of the Tamborine Mountains, McPherson Ranges and Cunningham's Gap in south Queensland preserve part of its rainforest habitat.

Photo: L. Nielsen

Nest of Albert Lyrebird.

White-breasted Sea Eagle.
Close relation of Bald Eagle.

Photo: David Fleay

Children's Nature Observation Book Prize

The White-breasted Sea Eagle

David Jackson

Age 11 years.
Double Bridges,
Ballina, N.S.W.

The White-breasted Sea Eagle has always interested me. My chances of studying this bird of prey have been fulfilled by a pair which nest annually quite near our house.

I have mostly seen this species (*Haliastus leucogaster*) hunting in pairs over the mouth of the Richmond River. There is a sand bar there which provides shallow water for fishing. Furthermore, it is only about six flying miles from their nesting site.

I am convinced their main source of food is carrion and offal left by the tide. Fish form the main live catch and I have seen them with sea-snakes. I have never seen them kill a wild bird. One of the most amusing sights I have ever seen was a young Sea Eagle attacking a young Jabiru. The Jabiru, squawking harshly, ran as fast as its astonishingly thin legs would carry it to its parents, who took off, rattling their mandibles, and drove the attacker away. Once two of our fowls were taken but I don't think the Eagle would commonly do this.

The pair I studied have two nests on a low ridge. They are about a hundred yards apart and both are in the main fork of a dead eucalypt. The diameters of both are about eight feet and the height about four feet.

Each year the birds use a different nest from the previous one. Firstly they add to it and then lay two white eggs. The young birds are a dirty brown colour. When they are old enough to fly, the parents push them over the edge of the nest. Usually they let out a squawk and glide into a tree below. All this can be observed with binoculars from the top of the hill above the nest.

It is interesting to watch the parent birds returning to the nest after a hunt. They glide in over the scrub surrounding the nest to about twenty yards past it. Then they turn around and glide on to the nest using the off-sea current.

The young birds seem to lose contact with their parents soon after leaving the nest.

Congratulations on an excellent entry.—Bill Jones.

Grey Horseshoe Bat.

SAVE THE CAVE

—A Pathway to Fauna Protection

By P. D. Dwyer

CAVE CONSERVATION? At first sight there may not seem a lot of point in conserving a rather small and dirty hole in the ground, a limestone cave beneath a large fig tree, a cave that would certainly never be considered suitable as a tourist attraction. Yet this is precisely what happened in the Macleay Valley, near Kempsey, during 1963. The New South Wales Fauna Protection Panel was able to save the Willi Willi Caves from being blasted in

Photo: B. Lowry

Young bent-winged bats massed on a cave roof.

and mined for guano. This too, may initially appear a paradox. The Fauna Protection Panel saving a cave! But the clue is guano, for the guano deposits present in the cave originate from a large mixed colony of three different species of insect-eating bat, a colony that may number 30,000 in mid-summer.

WINTER at Willi Willi can be cold. A long climb up the lantana-covered ridge, a duck-under entrance to the cave, and finally the scramble down a rock-strewn slope and you are in the outer chamber of the system, a long, high room with a musty smell and an intricate network of corridors running off the side walls. On the left a narrow cleft slopes down. This leads to a passage seventy feet long, and sometimes so low that you must crawl on hands and knees, dragging your feet through pools of water and knocking your helmeted head against the roof. This is the passage to the bat chamber, an enclosed room that reeks of ammonia and is piled high with damp heaps of accumulated guano. Here the roof is stained black, and the walls come away as handfuls for they have been rotted by years of urine trickling down from above. A few rats run from under your feet and a hundred solitary horseshoe bats (*Rhinolophus megaphyllus*) hang torpid from the walls — grey horseshoe bats wrapped in their wings with only the tips of their long pointed ears visible. The cave is cold and asleep for winter.

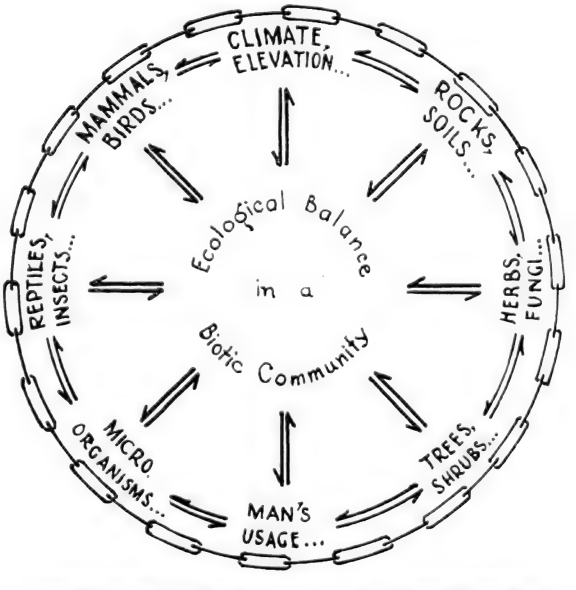
BUT with spring things change. The horseshoe bats wake, prick up their ears and rotate in an almost full circle, as they hang by one foot, and beam their sonar at you with unerring accuracy. The cave begins to fill. Four thousand little bent-winged bats (*Miniopterus australis*) move in. Several hundred new horseshoe bats appear, pregnant females that mass together as clusters on the roof, and thousands upon thousands of large bent-winged bats (*Miniopterus schreibersi blepotis*) arrive, and keep arriving, all through spring. During

the day the roof is massed with clustered, squeaking bats and day by day as numbers increase, as more and more bats fly along the narrow passage to the bat chamber, the air becomes warmer. The heat from thousands of ever flying bats warms the air of the chamber, and the narrow corridor acts as a trap that prevents the heat from rapidly dissipating away. Gradually the chamber is being converted into a giant incubator in which the baby bent-winged bats will be born and reared to independence. Already, late in spring, the horseshoe bats have given birth to their single young and in December, into the mass of 500 young horseshoe bats that hang pink-nosed from the roof, the first bent-winged young are born. Within a month eight square yards of roof are carpeted with young. Twelve thousand baby bent-winged bats packed into ceiling crevices, squeaking and crawling, pushing and biting, learning to fly — and falling, climbing backwards up walls, trapped in the liquid guano, washed away by the small summer stream running through the chamber, or captured and eaten by rats. A squirming mass of naked life teeming with a myriad mites.

And in summer as the warm dusk settles in, and the Kookaburras mock the world for the last time till dawn, a bat flits to the cave entrance, wheels, and returns to a familiar darkness. Inside, the cave has come alive. The massed bats are peeling from the roof; the air is whirled through the chambers and passages as thousands of bats take flight. Finally the first cautious flights to the darkening entrance until eventually a bat flips out and back; a second does the same, and a third, and a fourth, and suddenly the frantic helter-skelter of 15,000 bats clamouring at a small cave entrance, dodging the overgrowing lantana, and rapidly dissolving into the night. Horseshoe bats 'rattling' as they flutter with great agility amongst the low shrubs, and the bent-winged bats screaming their silent insect-locating calls as they race through the air above the forest. The cave left to the rats and the ever-squeaking young, and the night air filled with bats — perhaps 40,000 of them over the Macleay Valley, all insect chasing through the dark. Two hundredweight of insects chopped to pulp each night! And before dawn lights the sky, an hour-long rush of bats hurtling into the known safety of the cave. Mothers seeking out their young to nurse, a mad hustle and bustle for just a few hours and then slowly sleep creeps in and the day-night of the underground begins.

By autumn the young are full grown. At night they too fly from the cave to feed. But now in the dawn fewer bats return. The mothers leave first and fly for autumn roosts perhaps 50 or 100 miles away; and then the young disperse, seeking out suitable caves or mines where they may spend the winter. In a month the cave has been left to a handful of horseshoe bats. The bent-winged bats spread out over the entire Macleay River watershed, for Willi Willi is their only breeding cave in the area. Every spring the pregnant females return and every autumn their young disperse. Year after year the same repeated pattern occurs, a tradition of centuries standing, a tradition that must not be broken if the species are to survive.

—from *Nature Conservancy News* (U.S.A.).



Bound together by "a chain of circumstance", the physical factors, the living things and Man's efforts to disturb, interact and reach the point of equilibrium which we know as the Ecological Balance

'A harmonious relation to land is more intricate, and of more consequence to civilization, than the historians of its progress seem to realize. Civilization is not, as they often assume, the enslavement of a stable and constant earth. It is a state of mutual and independent co-operation between human animals, other animals, plants, and soils, which may be disrupted at any moment by the failure of any of them. Land-despoliation has evicted nations, and can, on occasion, do it again. As long as six virgin continents awaited the plough, this was perhaps no tragic matter — eviction from one piece of soil could be recouped by despoiling another. But there are now wars and rumours of wars which forestall the impending saturation of the earth's best soils and climates. It thus becomes a matter of some importance, at least to ourselves, that our dominion, once gained, be self-perpetuating rather than self-destructive.'

GUANO mining at Willi Willi would only prove practical if a new surface opening was blasted into the bat chamber. And if this happened the chamber could no longer trap heat from the colony. The incubator-like conditions needed for growth of young would not result and the two bent-winged species could no longer breed there. Now animal species do not readily transfer traditions established over many generations and so, even if other suitable caves existed, it is not likely that they would be colonized. The Macleay populations of bent-winged bats would become extinct, 40,000 bats would die, and the most southerly-known population of little bent-winged bats would be sent into oblivion.

Many species of birds and mammals rely upon traditional sites for breeding. The well known migrations of seals and mutton birds represent annual excursions to and from such grounds. Penguins, egrets (see 'A sege of Herons', *Wildlife* Vol. 1, No. 3), and gannets are other species that return each year to the same breeding place. Conservation of such species depends, in essence, upon protection of these sites. Traditions are all too easily shattered and all too difficult to repair. The extinction of the American passenger pigeon resulted from excessive human disturbance at traditional breeding grounds. And since, in Australia, the survival of bent-winged bats depends upon the existence of a few special breeding caves these should be conserved.

But why bother? Why save these local populations and lose the financial benefit that might accrue from the guano? Why conserve these three rather insignificant species of mammal? Well, to start with, there are the reasons of aesthetics, reasons that I will not elaborate here for you know them already. You probably would not have bought this copy of *Wildlife* and be reading this article if you were not in sympathy with fauna conservation simply for aesthetic gain. But such arguments are of little use to those who do not share this emotion; we must be more practical for them. And in this case there are two immediate reasons for conservation.

Firstly, the Macleay bats are currently being studied as part of a research project at the University of New England. This project is specifically related to the problems concerning animal numbers, problems that have all too frequently hit the purse strings of man. One need only mention rabbits! In addition the project is part of an almost Australia-wide investigation of bat biology that is co-ordinated by the Wildlife Research Division of C.S.I.R.O. In many parts of the world bats act as carriers of diseases such as histoplasmosis and rabies and, unfortunately, the efficiency of modern communication always poses the problem of accidental spread to previously disease-free countries. If this happened in Australia prior knowledge of bat biology would prove very valuable.

Secondly it is not at all possible to assess the ramifications of such an extinction. The bats are insect-eating species but just what insects they eat is not yet known. The estimate of two hundredweight of insects eaten each night represents a mighty lot of insects and if these proved to be species of economic importance either in terms of agriculture, grazing, or forestry, the consequences could be very considerable.

These, then are the practical reasons. But to me as I sit at a cave entrance in the evening and the bats pour out, and a boobook flies from its perch in a fig tree to pick an easy meal from the air, and the draft rushing out the cave entrance carries with it a huge and familiar 'bat-cave' smell; to me the best reasons are aesthetic.

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The Gammon Ranges

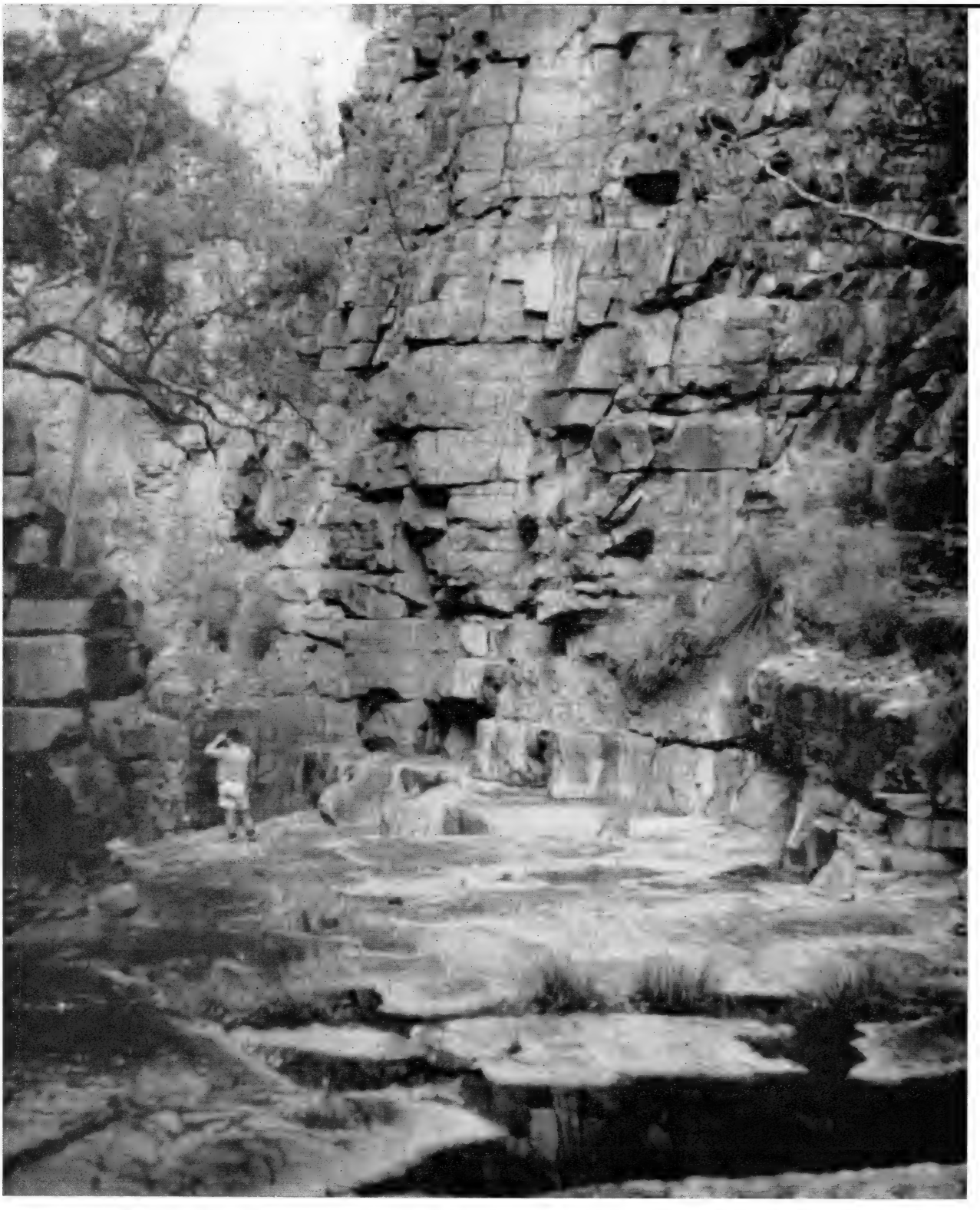
By D. W. Saddler

Photo: D. W. Saddler

THE most important physical feature in South Australia, the Flinders Ranges, runs in a broad strip 250 miles long and up to 50 miles wide from Pt. Pirie in the south to subside into the great plains of inland Australia at Mt. Hopeless in the north. The Gammons are a small area less than 20 miles square in the Northern Flinders. Although the surrounding country has been occupied by sheep stations since about 1850 there is only one entry into the area recorded before 1947 — by a lone Frenchman who crossed the Range. Even the aborigines shunned the Gammons because of the loud rumbling noises which often issued from within the area; these they attributed to the giant serpent Arkaroo which retired to the ranges after drinking all the water of nearby Lake Frome, a dry salt pan. Since the first exploring party entered the Gammons in 1947, they have been visited fairly frequently by bushwalkers and scientific parties, but are still not completely explored.

Essentially the Gammons consist of a relatively flat-topped quartzite massif of average altitude a little over 3,000 feet, usually called the Main Range. The highest point is Benbonyathe Hill (3,490 feet) at the north-east end of the Range, but it is an inconspicuous feature: the most prominent peak is Mt. McKinley (3,370 feet) which stands apart from the Main Range to the south. To the north and west the Gammons slope gradually down to the level of the hills which stretch to the west. On the south and east they fall off abruptly and are deeply dissected by the headwaters of two creeks which run out to Lake Frome. It is this south-east part of the Gammons that is most frequently visited because it contains the most spectacular scenery. Several subsidiary ridges run out from the Main Range and each terminates in a great cliff. At their base is a low hilly pound area to which they form a broken wall. The other wall is a low dolomite range — the Balcanoona Range. Several creeks flow out through the gaps between the cliffs into the pound where they join to form two large streams, each of which cuts a gorge through the

A general view of part of the main range, showing the flat top, deep narrow gorges, and scrub vegetation.

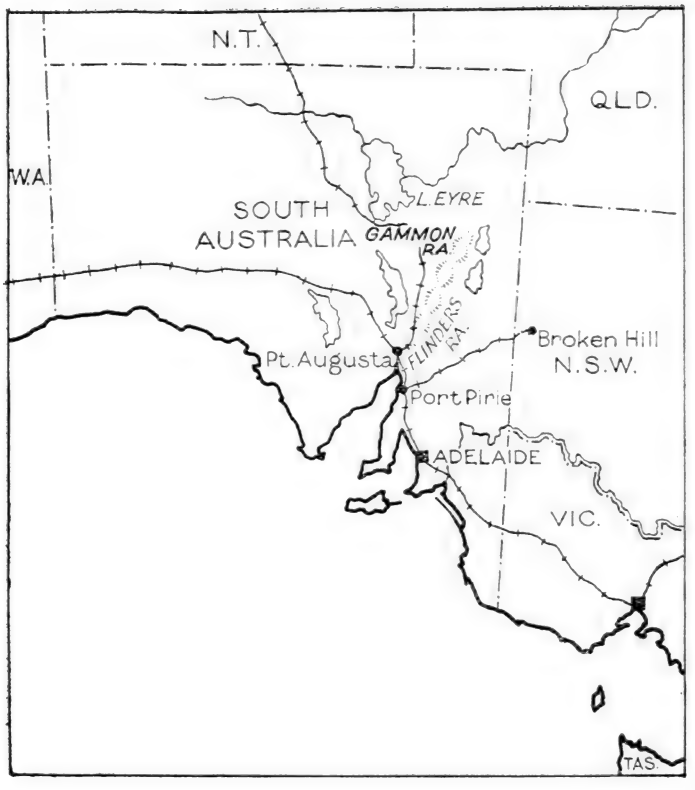


View in a gorge looking down over the edge of a dry waterfall. There is no debris on the floor because it has all been washed over the edge.

Photo: D. W. Saddler

Balcanoona Range on its way to the plains and Lake Frome. Since there is a road close to the outside entrance of each gorge, they provide the easiest access to the south-east Gammons. There is a ten to twelve mile walk through the Balcanoona Range and across the pound to the entrance of gorges in the Main Range. The gorges are the most fascinating part of the Gammons. The walls rise up to 1,000 feet on each side, great broken cliffs of brilliant red rock, dotted with scrubby bushes; the floors are piled with broken boulders that have fallen from the walls above, under and between which tall, slender trees and bushes grow. Small patches of grass are common between the rocks, and occasional pools of water can be found in particularly well shaded rock holes, making the gorges strikingly different from the harsh, dry country outside. This heightens the omnipresent visual sense of enclosure and remoteness — in many places the walls are only 20 feet apart and the sun is seen for an hour or less at midday.

The quartzite massif is heavily faulted; the largest fault can be seen running in a straight line for five miles,



and it cuts right through the middle of one prominent feature which was named Cleft Peak by the first party because of this. There is practically no mineralization in the Gammons, which is one important reason why they were left undisturbed for so many years.

Because of the diversity of habitats in the area, the vegetation of the Gammons is quite complex. All the surrounding country, including the pound area, is covered with shrub-steppe vegetation found throughout much of arid Australia; this consists of scattered xeromorphic shrub species with a discontinuous understorey of annual and ephemeral herbs.

THE steep slopes of the Main Range are covered chiefly with native pine (*Callitris propinqua*), yaccas (*Xanthorrhoea quadrangulata*), and clumps of 'spinifex' (*Triodia irritans*). From a distance, the otherwise bare rock of these slopes appears to be covered with green dots of different sizes.

The vegetation along the bottoms of the gorges is dominated by native pine and red gum (*Eucalyptus camaldulensis*), which merge into the pure red gum stands along the larger creeks. In addition, there is a number of attractive shrub species; the most showy are *Indigofera* spp., *Eremophila* spp., and *Templetonia retusa* which grows as a small tree up to 15 feet high, covered with large red pea-flowers. In both the native pines and the red gums there is an interesting adaptation for survival at the bottoms of the gorges; the leaf pigmentation is much bluer than in the same species growing in more open situations, enabling them to absorb an unusually high proportion of red light; the light in the gorge bottoms is predominantly red since it is nearly all reflected from the walls.

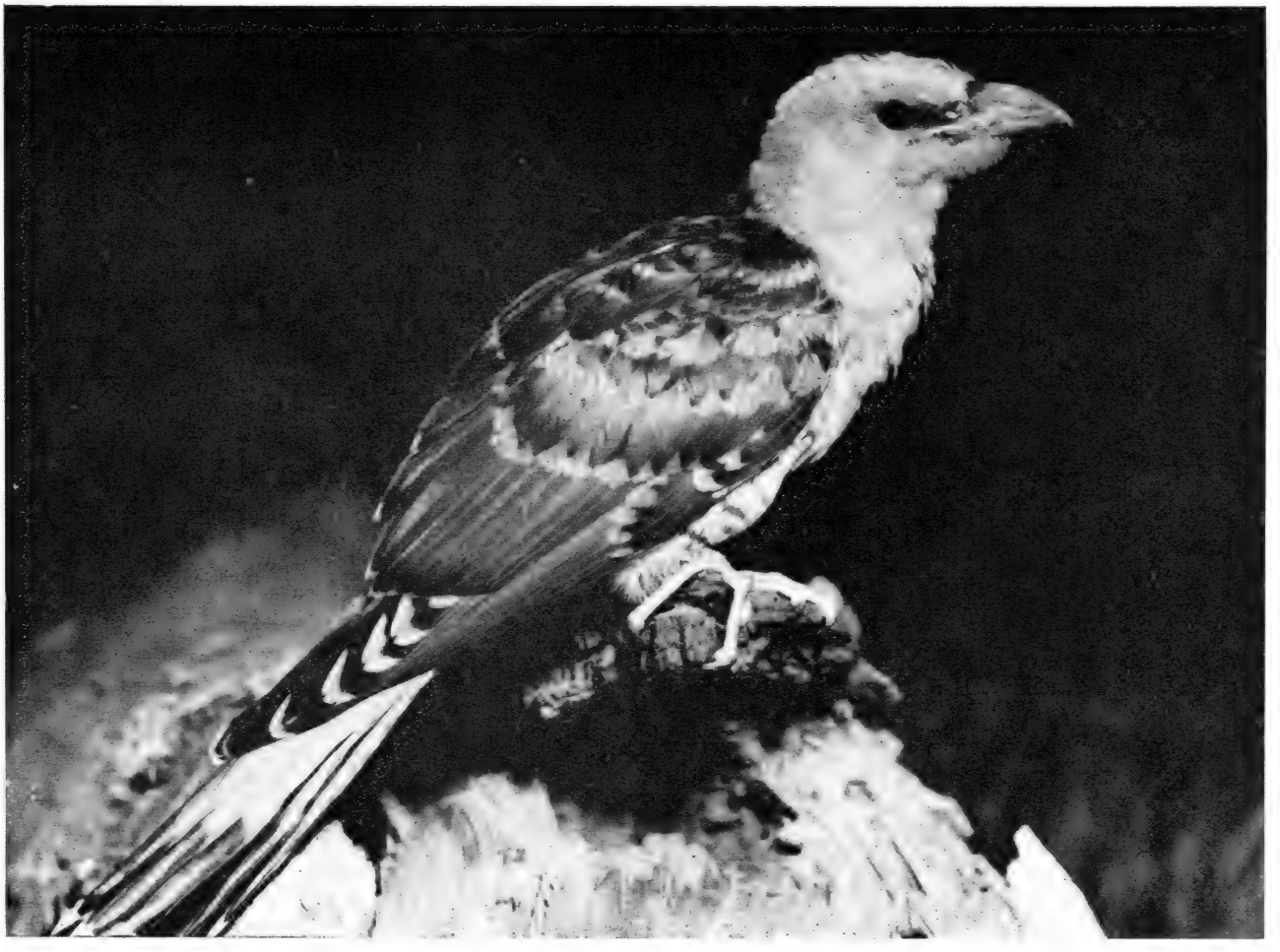
The most interesting type of vegetation in the Gammons is that which grows on the crest of the Main Range. It is a dense sclerophyllous scrub, about 10 feet high and very difficult to penetrate. It is floristically poor, containing only about twelve species, of which four predominate. There are *Eucalyptus morrissii, Melaleuca glomerata, Acacia havillandii,* and *Casuarina muelleriana.* Other important species are *Grevillea aspera, Spyridium phlebophyllum, Callistemon teretifolius,* and *Calythrix tetragona.* This type of vegetation is found also in a few other smaller areas further south in the Flinders Range. In each case it is associated with quartzite rock and is always at a higher altitude than the surrounding country which probably means a considerably greater rainfall.

Unfortunately the whole area has been overrun by feral goats and the effect of their voracious appetites on the vegetation can be seen in many places; this has obviously also had a marked effect on the numbers of the native mammals. Euros probably live in the area but are not at all common. There is a small colony of yellow-footed rock wallabies (*Petrogale xanthopus*) living in a particularly remote and rugged area. This beautiful little animal (it is only about 30 inches high), found only in South Australia, was once common throughout the Flinders Ranges but is now confined to a few small, isolated populations. It is, of course, totally protected, but it seems likely to become extinct unless definite steps to ensure its survival are taken soon.

RED kangaroos are common in the area outside the main range; this part is also used for grazing sheep and emus also live there.

The area is rich in bird life; this is particularly true of the gorges, where many attractive song-birds live. Birds found throughout the area are generally those that live in the arid regions away from the ranges as well. Common ones include the Galah (*Cacatua roseicapilla*), the Budgerigar (*Melopsittacus undulatus*) and several other parrot species, and the Yellow-throated Miner (*Myzantha flavigula*); most of these birds move in large flocks, and they all nest along the tree-lined creeks. The Wedge-tailed Eagle (*Aquila audax*), the Whistling Eagle (*Haliastur sphenurus*), and several species of hawk and falcon are also seen throughout the area, but they undoubtedly nest in the rocky fastnesses of the main range. The Australian Raven (*Corvus coronoides*) is also common. Along the creeks and in the gorges there is a great variety of birds. Among the most common are the Diamond Dove (*Geopelia cuneata*), the Red-backed Kingfisher (*Halcyon pyrrhopygia*), the Red-capped Robin (*Petroica goodenovii*), the Pied Butcher-bird (*Cracticus nigrogularis*), the Black-backed Magpie (*Gymnorhina tibicen tibicen*), and the Magpie Lark (*Grallina cyanoleuca*).

The Gammons are one of the very few areas in South Australia that have never been used by man, and are therefore ideal for acquisition as a wildlife reserve. Such a move, followed by a campaign to eradicate the goats, would make this unique area a national asset.



Channel-billed Cuckoo, largest of the tribe.

The Cheek of the Channel-bill

By Eric Zillmann

DURING my bush ramblings I have encountered varied members of our native fauna and learned much of interest about them. There is one question, however, which though having fascinated one for many years, seemed until recently to have no ready answer. This was the problem of discovering the method whereby the Channel-billed Cuckoo (*Scythrops novae hollandiae*) laid its eggs or eggs in the nest of another bird. The following is an account of observations which I have made on several occasions while visiting the bush for the purpose of studying our nocturnal indigenous animals; observations which have led me to believe that I may have found the answer to the question of the Channel-bill and its egg-laying.

During the year of 1962 I spent many evening hours in the bush in search of the Barking Owls and their nests. One evening, having arrived in the bush at dusk, I watched the birds making their final flights and calls for the day. Gradually, activity ceased, and there soon prevailed the period of silence which follows the bedding down of the diurnals but which is not yet disturbed by the still-sleeping night-venturers. Only for a short while did this calm last though, as first one and then several Boobook Owls shattered the silence with their calls. The chorus of the wakening Boobooks soon aroused the White-throated Nightjars which now assumed the role of music-makers, while the Boobooks went about their business of searching for food.

By this time the possums and gliders were well on the move, making their ways from tree to tree in search of nourishment. Gliders were abundant in the area (in one tree alone I noticed six gliders and several brushtail possums) and their shrieks and squabblings predominated over other sounds until their marsupial appetites had been satisfied.

The time was now 9 p.m. and through the trees I clearly heard the low squawking call of a pair of Channel-bills. The calls grew louder as the birds approached by making short flights from tree to tree. Then all of a sudden, in a nearby tree, a nesting crow wakened, startled, pierced the night with a shrill 'ark, ark, ark' and fled its nest to fly around its tree in a frenzy, not knowing what to do.

Presumably one of the Channel-bills had startled the Crow into abandoning her home while the other Cuckoo took over the Crow's nest prior to laying her egg or eggs. During the performance the airborne Cuckoo kept up his low call,

no doubt offering encouragement to his mate. After about twenty minutes the nest-usurper called loudly to its mate, which gave an answering call, then joined the female to fly off into the night. The Crow continued to fly about distractedly, uttering the distressed 'ark, ark', and probably did not return to her nest until daylight.

This was not the first occasion on which I had seen this display and neither was it to be the last. Some time later a Crow which was nesting in a tree near our home was suddenly disturbed by a Channel-bill. I heard the commotion while lying in bed and promptly rose to observe the rest of the performance and take note of subsequent events. In due course the Crow hatched the abandoned egg and as time went on, fed the youngster on scraps which she stole from near our home.

Again, a few days later, I noted several Crows feeding a Channel-bill some miles from here.

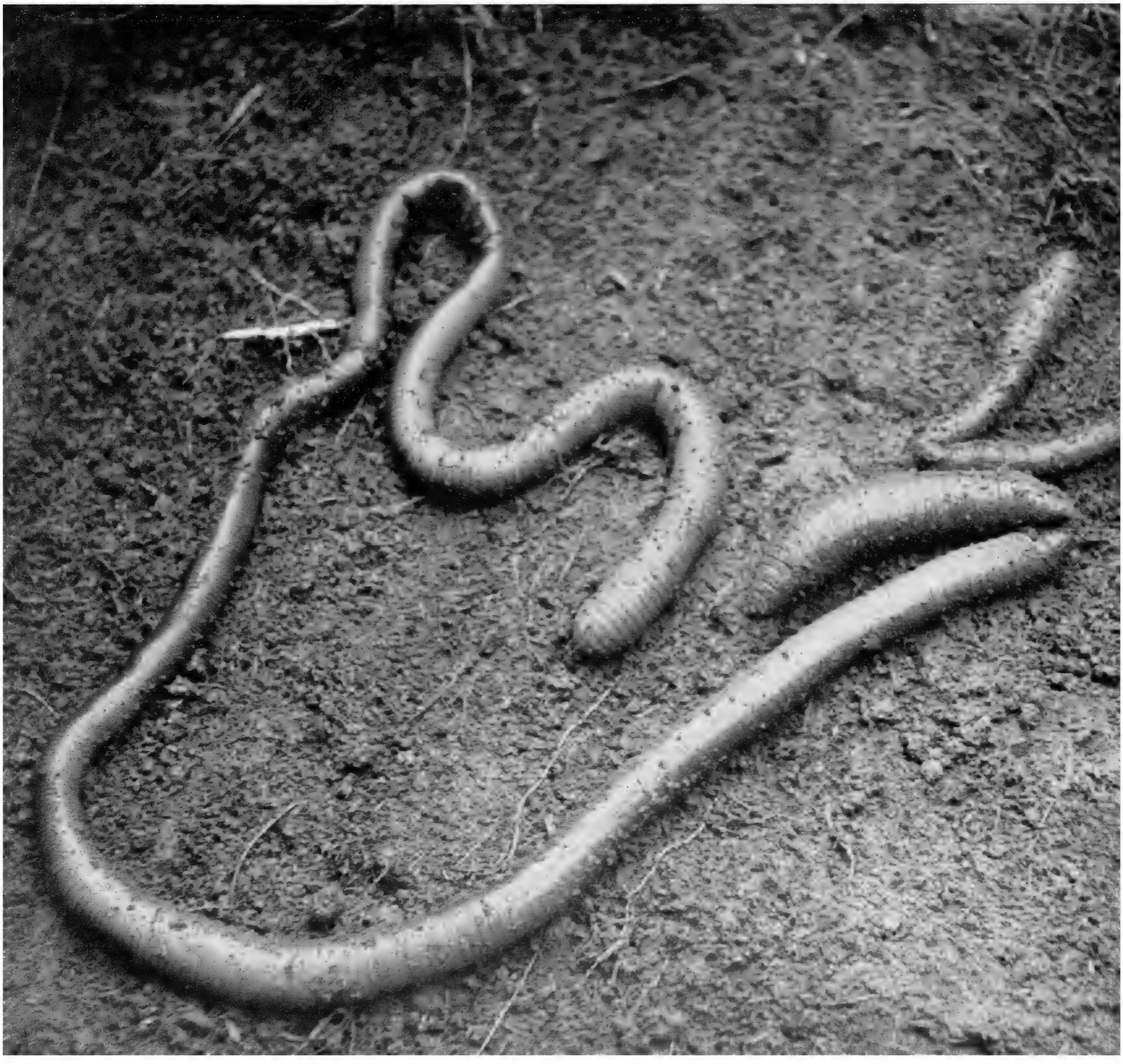
On another occasion a neighbour reported a strange sight which he had witnessed near his home. He asked me to identify a mystery grey bird which was being fed by a Crow. That's right. It was a Channel-bill.

Is it possible that this may be the normal way in which the Channel-bill goes about its egg-laying? Could it be that the cuckoo invariably abandons her egg or eggs in the nest of the Crow, leaving to the latter the job of incubation and the rearing of the young? What do you think?

Pied Heron. Photo: E. Slater

The Giant North

The Giant Earthworm (Digaster longmani) 4 feet 3 inches long.



ern Earthworm

By W. Jones

Photo: W. Jones

THERE are about 150 species of worms in Australia — both native and introduced. The introduced species are known as 'Peregrines' which means they move from one place to another. Although worm shapes are much the same, they come in many different sizes, from tiny creatures so small they may pass unnoticed, to large, fat specimens attaining lengths of six to eight feet and three-quarters to one inch across. Two very large kinds, probably the largest in the world, are native to Australia. One is found in Gippsland, Victoria (*Megascolides australis*). Well known for its giant size, it attains eight to nine feet and a length of twelve feet has been recorded.

Another large kind — the Giant Northern Earthworm (*Digaster longmani*) is quite common in Toonumbar State Forest in northern New South Wales, near Mt. Lindesay. Large specimens of *Digaster longmani* grow to six feet in length and one inch in diameter. They are found in deep, red basalt soil on a small plateau at an elevation of about 1,800 feet. The area is covered with dense sub-tropical rain forest which has a rainfall of 55-60 inches per annum. The tall rain forest trees, many of which exceed 100 feet in height, are clothed by epiphytic orchids, ferns, large vines and creepers. On the moist rain forest floor woody vines, wiry creepers, ferns, mosses and fungi abound. Beneath this wealth of vegetation and tangled network of surface roots anchoring tall Booyong, Sassafras, Carrabin, Rosewoods and many other species, below the surface of the deep red soil, litter and humus, in burrows that weave in and out among the shallow roots of the rain forest trees, is the home of the Giant Northern Earthworm (*Digaster longmani*). For ages these giants of their kind had remained unknown and undisturbed in their chosen habitat until 1939 when bulldozers began pushing the rain forest trees

Photo: W. Jones
Typical habitat of the Giant Northern Earthworm (Digaster longmani).

aside, to clear a roadway through the forest to tap the rich stands of timber in the area. The bulldozer blades pushing aside uprooted trees and soil exposed the giant worms and their burrows for the first time. As the road penetrated deeper into the rain forest the worms became more plentiful. This event was hailed by chuckles and gurgles from the local Kookaburra population. One large worm proved more than sufficient to provide a meal at one time even for a greedy Kookaburra, who does not seem to mind the unpleasant odour given off by the large worms. It has been stated that most birds find the worms unpalatable due to this peculiar smell.

Although the giant worms are quite common in their natural habitat, they are seldom seen on the floor of the rain forest. They may be seen in the roadside ditches along roadways after heavy falls of rain, when they emerge in large numbers from the rain-soaked soil. Many cannot return to safety beneath the soil as they are either caught by hungry kookaburras or become paralysed by exposure to strong light, to which they are extremely sensitive. When caught out for even short periods in strong sunlight their movements become slower and slower and eventually they die.

MOVEMENT along their burrows, to which they are well adapted, is quite rapid. Progress is accomplished by expanding one end of the body against the outer walls, then drawing the rest of the body up to it. Small bristles on the body also assist movement. The worms have a built-in lubrication system which seems to serve a dual purpose. By exuding small jets of liquid from their bodies they are able to keep the outer skin moist and at the same time lubricate the walls of the burrow to make their progress easier.

To remove one of these giants from its burrow is something of an art (like catching seaworms) and in making the attempt one is impressed by their great strength. Hanging on to one end and trying to pull one out of its burrow usually results in the worm stretching to about twice its normal length, then breaking into two pieces. If the creature is allowed to draw part of its body along the burrow it has to relax the expanded end to do so — a steady tug at the right moment does not give the worm time to expand and the result is a whole worm to study. These lowly worms, living out most of their lives below the ground in darkness, serve a very useful purpose. They consume large amounts of leaf litter which is converted into usable food for plants, and the numerous burrows made by them serve to aerate the soil. Normally worms do not venture out in daylight hours, as they are nocturnal creatures; so we might twist the familiar old proverb and say perhaps it is the late bird that catches the early worm! *Digaster longmani* demonstrates the close relationship between animals and their habitat. Once the rain forest is removed the worms may disappear as do many other less conspicuous inhabitants of these forests. Little undisturbed rain forest remains outside National Parks, which surely highlights the urgent need for conservation of this type of habitat.

Giant Flightless Birds

By G. Robbins

RATITAE is one of the two main divisions of birds, this section being composed of birds having small or rudimentary wings, no pygostyle and no keel to the breastbone. These flightless, running birds include the Ostrich, Emu, Cassowary, Rhea and Kiwi.

The Emu (*Dromaius novae-hollandiae*) is the second largest bird in the world, one of the fastest. It is found all over Australia and is well known because of its pride of place on our coins and stamps. Others remember its plumes adorning the Light Horse Brigade's hats during the 1914-18 war.

The Emu's breeding season is usually from April to November. The male Emu does most of the hatching of the eggs, which number between five and fifteen, averaging nine. When the eggs are first laid the female shares the incubation but is soon displaced by the male. The eggs have a granulated surface and are olive green in colour, being five inches long and approximately 1 lb. 9 ozs. in weight. Many of these eggs have found their way into omelettes, and one Emu egg is equal to approximately eight hen eggs. The eggs contain oil and the eggs are broken into a basin and left overnight; the oil rises and can be poured off before cooking. The eggs hatch in six to eight weeks. Only a rough nest is made on the ground, being composed of twigs and grass trampled down. The eggs all hatch within two days of the first chick appearing; the chicks are fed on bits of grass and grass seeds. The male does all the feeding, chasing the female away when she tries to assist. In feeding the brood the male grows thin and weak, but fortunately the baby Emus feed themselves in a very short time.

Emus live mainly on grass and seeds but eat berries, native fruits and insects. Emus travel in flocks but separate to mate and rear their young; when the flock re-forms the young Emus fend for themselves. Young Emus have a short neck, coarse down marked with brown and white stripes and no tail. The adult Emu grows to four and one-half to five feet high and weighs between 70-130 lb. It has a smooth blue-skinned neck, large brown eyes and deep sunken ears. Its long powerful legs are bare of feathers to the knee, the forelegs being scaly. It has three toes, the middle toe being long, thick and protruding, with a sharp hooked claw. Colouring is on full back; black, grey to white on the neck, and the flanks are a brownish bronze. Albinism is not rare in emus, but is not common.

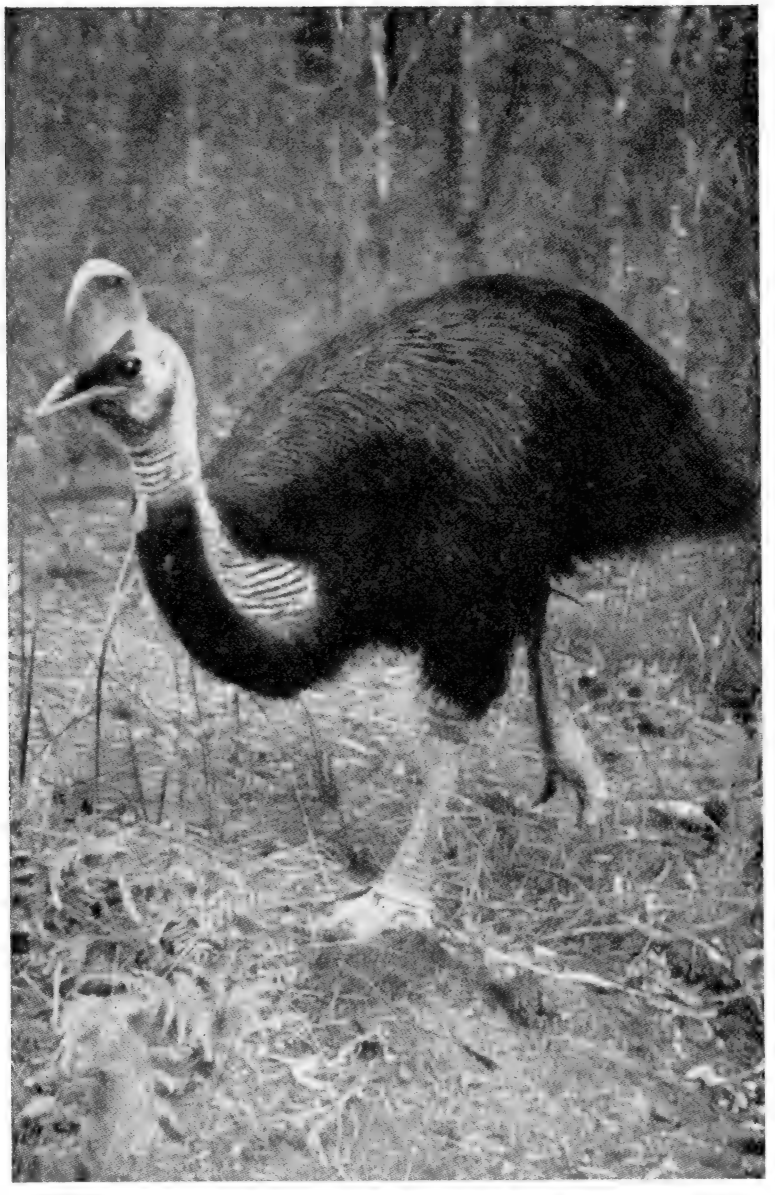
The Emu's feathers are unusual in having two plumes growing from the one quill. The Emu makes deep, throaty grunts and resonant drumming noises. It can swim, sometimes swimming to islands to lay its eggs. Emus have been credited with running 35 m.p.h.

Natural enemies are the Wedge-tailed Eagle (*Aquila audax*) and the Dingo. The Eagles pluck chicks away from their parents, breaking their necks with a blow of their hooked beaks. They have killed adult Emus by striking them just behind the ear while they are running, for they run with their long necks fully outstretched.

When alarmed, the male puffs up the feathers on his neck and makes deep loud drumming noises, the chicks make plaintive whistling noises, running hither and thither before lying flat on the ground with their necks flattened out. Emus have been known to kill dingoes, inflicting grave wounds with their vicious kicking. The Black-breasted Buzzard (*Hamerostra melanosterna*) waits until he finds a nest unattended and then picks up a stone in his claw and drops it on the egg, this being repeated until the crack is wide enough to insert his beak and suck out the egg's contents. The eggs of the Bustard (*Eupodotis australis*) suffer the same fate. Man, both black and white, is the Emu's worst enemy, although in the wild the Emu soon becomes used to human habitation, walking up to the homestead for scraps of food. White men have killed Emus by the thousand because they break fences and foul pasturage which they also eat when food is scarce.

THE aboriginal uses many ruses to trap the Emu, many making use of the bird's curiosity. A native will lie in long grass and pedal his legs, the Emus

Emu. Photo: David Fleay



Cassowary.

venture quite close and are speared when the black man leaps to his feet. Another method is to make a large ball of Emu feathers and bright rag and attach it to a long cord of human hair. The native conceals himself amongst the branches of a tree and lowers the ball and rotates it while imitating the Emu's drumming. The curious birds approach and are speared. They also stalk the birds, using trees to avoid being seen until within spearing distance. Aboriginals have chased Emus into huge nets set on frames or trees, have built brush fences to guide Emus into a pit; while the birds were drinking they have strung nets along tracks leading from the waterhole and the birds were then alarmed by their shouting and some would run headlong into the nets to be despatched. Emus have also been stupefied with various bark and leaves and with pitjuri which contains toxic secretions when placed in a waterhole or soakage. Pitjuri (*Duboisia hopwoodii*) is a plant which grows in the Upper Mulligan River area of south-west Queensland. The leaves and stem were collected, dried, and broken up into small pieces. Quids of these were chewed as a mild narcotic. Pitjuri was traded over a large area of south-west Queensland, eastern Central Australia, western New South Wales and north-western South Australia.

In Queensland and the Northern Territory the natives used the skin of an Emu to disguise the hunter who sneaked up and speared the bird. They also waved light coloured objects to attract the birds close enough to be speared, speared it on its nest and surrounded a flock and then speared them as they escaped. The Emus were stripped of their feathers and put in a large hole and lightly covered with soil; a fire was built over the top and in this manner the bird was baked.

The flesh reeks of oil and is only relished by the natives, who also use the strong sinews from the legs to bind on spear heads. It must not be thought that the natives can kill an Emu any time they wish, as the birds soon become very wary and as they are very fleet of foot are difficult to catch.

Fortunately the Emu is easily tamed and lives well in captivity.

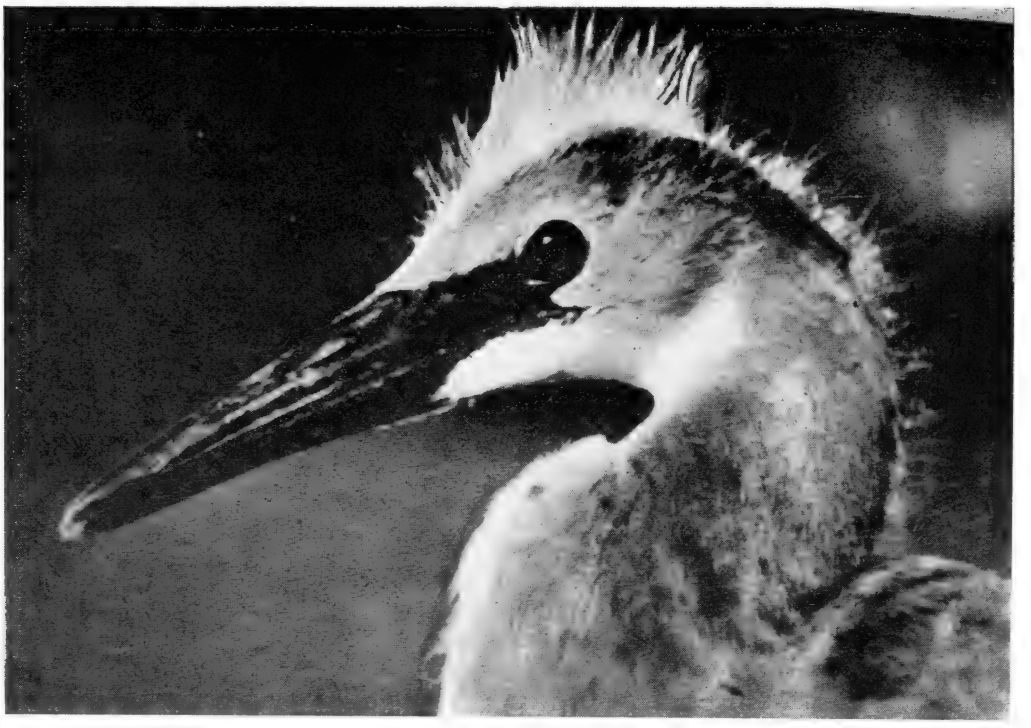
CASSOWARY

As well as north Queensland, the genus *Casuarius* ranges throughout New Guinea and some of the adjacent islands. Peters (1931) 'Checklist of Birds of the World, Vol. 1' lists a total of six species and thirty sub-species. The single Australian sub-species is *Casuarius casuarius johnsoni.*

The breeding season is from July to September; the nest consists of leaves, sticks, roughly three feet in diameter, usually at the base of a large tree in the dense rain forest. Three to five eggs are laid, being light green in colour with a granulated surface, the eggs are approximately five inches long. The Cassowary eats native fruits, seeds and berries and is a timid bird, frequenting the thickest part of forest by day, emerging at daybreak and dusk to visit feeding trees. It is a speedy bird, running in swift bounds far outstripping a horse, but unlike the Ostrich it receives no aid from its wings. It is a good swimmer. Its calls are prolonged, guttural croakings, quickly repeated, or a short, deep booming grunt.

The average height is about five feet and the Cassowary weighs in the region of 160 to 200 lb. The bird has a crested head which affords it protection in the thick forest, and a bare wattled neck of deep blue and fiery red which is set off by a reddish-brown eye of about one inch in diameter. The body is draped with soft, dark hairy plumes from three inches to fourteen inches long. The wings are short but are armed with five stiff quills with which it can strike a dangerous blow. It has three toes, the largest being three and one-half inches long; the feet are a light green colour.

The birds had few natural enemies but were hunted by the aboriginals using dogs in the thick rain forests; the birds were usually speared. In present times dogs, feral pigs, as well as the destruction of the emu's habitat, are resulting in a great decrease in their numbers.



White-faced Heron.

Mount Isa Notes

By S. Carruthers

NESTINGS

1. Rainbow-bird (*Merops ornatus*)
   Good rain received in the Mount Isa district in late December and Rainbow Birds immediately commenced digging their nesting tunnels in the sandy country along the river banks of the Leichhardt and its tributaries.

2. Magpie-lark (*Grallina cyanoleuca*)
   Following the December rains Magpie-larks started nest building. In the Mount Isa district they usually select the river Red Gums for nesting trees.
   However, a number of nests have been observed in small dead trees 6 to 10 feet high, partly submerged in the dam. These nests at breeding time must be no more than two or three feet above water level.
   In the first week of January a nest was discovered in a Coolibah tree growing in a billabong of Mona Creek on Ardmore Station 40 miles south of Mount Isa. There was a large number of Red Gums on the creek bank within 300 yards, but because the Coolibah was isolated by water from the bank or because the mud on the shore was the best building

Nest and Eggs—White-winged Triller.

material it appears that this pair had preferred the Coolibah to the gums. Four eggs were in the nest.
Some pairs were found still nest building along the Leichhardt in the first week of February.
Last year one pair nested in a main street in the town in April. This nest has since been used by White-breasted Wood Swallows as previously reported.

3. Black-faced Wood Swallows (*Artamus cinereus*)
While I have been unable to find a nest of this species, I've found young birds just able to fly on the first weekend in February. The adult birds became very excited and aggressive when we approached. These birds must have started nesting with the rain in late December. Second nest with three young found within 300 yards of home on Tuesday, February 5.

On the first weekend of February we found nests of:

1. White-winged Triller (*Lalage sueurii*)
The nest contained two eggs. It was placed on a low limb of a stunted rough barked Eucalypt near an artificial dam at the Golf Club. The nest was only 10 feet from the ground. While these trillers attack all birds that approach the nest, they flew out of sight and made no protest when we approached. However, at a second nest discovered near home on Tuesday, both birds attacked and hissed as they flew past.

2. Willie Wagtail (*Rhipidura leucophrys*)
One just completed nest was discovered in the fork of a low branch of a Gidyea tree seven feet from the ground. Eggs had not been laid. A second nest with three eggs was observed in a smallish Red Gum. This nest was easily accessible and about fifteen feet from the ground.

3. Budgerigar (*Melopsittacus undulatus*)
Budgerigars appeared to be nesting in hollow limbs of Red Gums all along the creeks and rivers in the district. Where water is available, however, they appear to breed throughout most of the year. Previous nestings were noted in March, July, August, September and October last year.

4. Tawny Frogmouth (*Podargus strigoides*)
Three Tawny Frogmouths were observed near the Leichhardt four miles south of Mount Isa in early January. On returning to the area on 9 February one was observed on a nest. Two young were born in mid-February.

5. White-necked Heron (*Notophoyx pacifica*)
On a visit to Happy Creek, 25 miles west of Camooweal and just over the Northern Territory border, in early February I discovered a nest of a White-necked Heron. The nest was in a low branch in a Coolibah standing in the water and it contained one egg. Two Royal Spoonbills appeared to have just completed nest building in the adjacent tree.

MARCH

1. Brown Thrush (*Colluricincla brunnea*)
On 2 March I found for the first time a nest of the Brown Thrush. The thrush normally builds in a stump or end of a hollow limb. However, this nest was on a sloping limb covered in a thick thorny vine. A second old nest was present, indicating that the bird had used the site before. The nest contained two eggs. On returning a week later to obtain a photo the bird was still at the nest but the eggs had disappeared without trace.

2. Little Pied Cormorant (*Phalacrocorax melanoleucos*), Little Black Cormorant (*Phalacrocorax sulcirostris*), Australian Darter (*Anhinga novaehollandiae*)
With major flooding of the dam in January and early February the Cormorants and Darters started to nest in sections of drowned forest. In one area over 100 nests containing eggs were discovered on 9 March.

3. Brolga (*Grus rubicunda*)
On the weekend 9-10 March several friends discovered a Brolga nesting on the open plain on Ardmore Station about 60 miles south of Mount Isa. One egg was present and virtually no attempt had been made to construct any form of nest.

ARRIVALS OF NOMADS AND MIGRANTS

1. Channel-billed Cuckoo (*Scythrops novae-hollandiae*)
The Channel-billed Cuckoo normally arrives in this area with the first summer rains (heavy enough to make the streams flow). With the rains late (the first heavy rain fell in late December) their arrival was also late. However, to make up for it, they then turned up in large numbers. Flocks of five and

Dinner time for two five-day-old Swallows.

six were observed along the Leichhardt south of Mount Isa in the first week of January, 14 in one group in February.

2. Painted Snipe (*Rostratula benghalensis*)
   I observed the first Painted Snipe I have seen in this district during the first week in January. It was feeding on the edge of a pond formed by the overflow of the sewerage treatment works.
3. Budgerigar (*Melopsittacus undulatus*) and Cockatiel (*Leptolophus hollandicus*)
   Probably due to the excellent conditions in the Mount Isa area, 10 inches of rain since Christmas (the area north and west has missed much of this rain until early February) the numbers of Budgerigars and Cockatiels have increased tremendously. For example, in areas along the river where you would normally encounter 50 or 100 Budgerigars, I observed many flocks of this size during the first weekend in February. I estimated that I observed 1500 to 2000 Budgerigars and 500 Cockatiel in 2½ hours in a small area north of Mount Isa on this weekend. Spinifex is seeding prolifically and they appear to be feeding on these seeds.

Note: It is noticeable that the opposite has happened with the Little Corellas, which were here in thousands before Christmas and are now quite scarce.

A Wildlife Refuge on a New England Property

By E. Bigg

LIGHT showers of shot falling on the iron roof of 'Swallowfield' homestead, in New England, used to awaken Mr. and Mrs. Lionel Bigg; the early morning duck-shooters were out along the banks of the River Gara.

That was before 'Swallowfield' property was declared a Wildlife Refuge — a place where guns and traps are liable to confiscation, and a place where black duck and teal, choughs and spur-wing plover are very much 'our feathered friends'.

The Swallowfield Wildlife Refuge extends over 826 acres of the property, but it is concentrated in the five-acre lagoon that stands below the homestead.

Giant weeping willows, descendants of those brought to the district from the Island of St. Helena, now shade its banks. Centuries ago the Gara ran through the hollow which has been made into a lagoon. It was used by the Bigg pioneers for sheep washing.

Droughts dried up the dam, duck shooters became more and more enthusiastic, 1080 killed most of the whistling hawks, and similar catastrophes were occurring, when Mr. Bigg decided on the sanctuary.

The lagoon, filled by the Long Gully which runs back into the Woodford property, now covers about five acres. Canna lilies, 'pussy willow' and other plants are growing on the islands of mud this year, providing cover for the ducks, which nest in island security.

When the duck-shooters are out in the lower reaches of the Gara, the ducks flock in hundreds to the Swallowfield sanctuary, and do a useful job while they are there. 'They're first-class at cleaning up the snail, liver-fluke and similar pests,' Mr. Bigg holds.

To make the waterfowl feel more at home, and to balance their diet, there are self-feed hoppers of cracked corn on each of the islands.

Two great birds were circling round and round a thousand feet up as Mr. Bigg was explaining the purpose of the sanctuary. 'Ibis scouts,' he commented, 'looking for country mountain grasshoppers and other insects. If they find anything, there'll be a couple of hundred of them here in two or three days' time.'

Earlier in the year they had cleaned up the green leaf grub which thrives in a newly-cut lucerne paddock.

At the same time a flight of spur-wing plovers chased a brown falcon into the depths of one of the willows in a flurry of wings and squawks. 'The falcons don't do much damage at Swallowfield, except when they begin taking the chickens,' said Mr. Bigg.

Whistling eagles are among his special pets. They nest in the big trees near the lagoon, and are invaluable in keeping down rats and mice. But they like chicken heads treated with 1080 just as much as foxes do, and in the last anti-fox campaign in the district, Mr. Bigg picked up eleven dead whistlers on Swallowfield.

The choughs are the favourites at Swallowfield. They chatter incessantly as they move over a paddock stripping off potato moth or corn grub.

LAST year an inspector saw the Swallowfield maize paddock, and told Mr. Bigg, 'You'll have to spray this within a week or so.' Mr. Bigg replied, 'No need. The choughs will clean that grub up in a couple of days.' Two days later the choughs were into the maize paddock, making a Roman feast of the grub which bores into the top of the cob and lets the water in.

Pelicans occasionally put in an appearance, resting for four or five days before moving on to more fruitful fishing grounds. Seagulls often drop in, usually a day before a storm. Rare white sea egrets, swans, osprey and Russian snipe are other visitors.

'All of these birds, the water-fowl and the birds of the open bush, are doing a most valuable job in the control of insect pests,' Mr. Bigg declares. 'I suppose Swallowfield would carry a few more stock, if I liked to clean up the timber; but the extra stock is not everything by any means.'

This article was reproduced by courtesy of the *Armidale Express*. The author's further comments follow:

THIS area of 826 acres was declared a complete sanctuary under the N.S.W. Fauna Protection Act in 1963. It includes a large area of open forest land, and about a mile of frontage to the Gara River, together with the lagoon, which was made into a dam by erecting a wall across the lower end of a swamp area, about 1875.

Lagoon at Swallowfield—a wild life sanctuary. Photo: Armidale Newspaper Co. Ltd.

A sheep wash was erected, and the water used to wash the sheep before shearing. This practice of washing the sheep was discontinued about 1880.

The lagoon has always been a favourite haunt of waterfowl of all descriptions. Both weeping and basket willows have been planted round the banks, and are now very large trees.

During a dry period in 1960-61, the water dried up, and during that period six islands were constructed, with tractors and scoops. This has made a big difference to the duck and waterfowl population. They now nest on the islands and are safe from foxes.

Black duck, teal, moor-hens and grebes use the islands extensively for nesting. This year six clutches of duck were reared in safety. Also spur-wing plovers, which were getting sadly depleted owing to foxes, have taken to nesting on the islands, and now a flock of over twenty are thriving. These are most valuable birds, and play a big part in keeping down insect pests on the adjacent lucerne paddocks.

OVER the years, I have come to realise that our native birds are more effective than artificial sprays in controlling insect pests; but sufficient tree cover must be preserved to ensure safe breeding grounds for them. Of course, birds cannot handle sporadic outbreaks of noxious insects, but under normal conditions, provided sufficient birds are there, they can and do prevent such outbreaks from developing into plagues.

Here is a list of local birds and their usefulness to graziers and farmers:

IBIS: Full marks on all insects, especially grasshoppers. Sends out scouts to look for infestations of 'hoppers, and they quickly bring the flock. No vices.

MAGPIES: All round scavengers, and all insects. No vices. Static, and need plenty of tree cover.

PEEWITS: Similar to magpies, but travel more.

SPURWING PLOVER: All insects, and especially green lucerne grubs.

CHOUGHS: All insects, but specialise on the maize-ear grub. Need plenty of tree cover.
KOOKABURRAS: Worms and grubs, especially scarab-grub and Christmas beetle grub; but robs nests of young birds and eggs.
WHISTLING EAGLES: All-round scavenger, fond of rats and mice. No vices.
ALL DUCK: Slugs and snails. Helps control fluke-snail.
MOORHENS: Similar.
CROWS: Some vices, but pay for their keep in insect destruction, especially blowfly larvae.
WEDGE-TAILED EAGLE: Some vices, but helps control hares, rabbits and rats. Should be protected.
STARLINGS: All-round insect destroyers.
SWALLOWS: Flying insects taken on wing.
DOLLAR-BIRDS: As swallows.

In the garden:
BLUE WRENS: Invaluable aphis-eaters.
GREY THRUSH: All garden insects.

New England Scene, Swallowfield.
Photo: Armidale Newspaper Co. Ltd.

Hunting for a Trophy

By Arthur S. Roe

HUNTING for a trophy, as distinct from hunting for food, has never greatly appealed to me. I once shot a big kangaroo as he was running away. It was a most unpleasant sight to see the big fellow collapse, and although the local boy with me took his skin carefully and made use of it by selling it, I have had no desire to shoot a kangaroo since.

Have you ever shot an elephant or seen one shot? No, neither have I, but I have seen a movie of one being shot and although it was a mercy killing of an animal which was slowly dying through damage caused by a poacher's wire snare, it was a most horrible sight to see this enormous mass of flesh collapse at the knees and fall suddenly to the ground. So if you have the urge to bring home an exciting trophy to show to your friends, my advice to you is to get some photographic equipment and chase the Fairy Wrens that can be found all over Australia. They are lively, intelligent, determined and courageous, and beautiful to look at. When you show them on the screen in natural colour, you have a wider and more appreciative audience than you ever will in a smoking room with a few bottles of whisky, showing off poor old lions' heads, or an elephant's foot made into a tobacco box — neither of which animals had a chance from the start of the safari.

There are quite a few varieties of Fairy Wrens in Australia. Three of them are found quite close to Brisbane. These three are the Red-backed, the Variegated and the Blue Wren.

These little birds have roughly the same habits. As a rule they live in grass lands reasonably close to water, preferably a creek. In each species there is generally some difference in the behaviour of the dif-

Photo: E. Slater

Brown Honeyeater savouring banana flowers.

ferent members, each individual bird suggesting a personality of its own. For instance, in one family the male might do most of the feeding while the female is too timid to come close to the nest. In another family the opposite takes place. I have seen this happen frequently and on each occasion the working member fusses about and then rushes up to his mate who is holding in his beak the food which he has just captured, takes it out of his mouth, and rushes back to the nest to feed the babies. One can almost hear him or her saying, 'Here, give it to me and I'll feed the brats!'

Then again most of the males have only one wife, but now and then an intelligent father features two wives — at least, he has two Jennies feeding the babies; perhaps one of them was an unmarried sister.

The little Red-backed Wren this year between Spring and Christmas, to our certain knowledge had at least three hatchings, which were fed assiduously by two Jennies. They worked very hard, often coming back at the same time with food in their mouths, while his lordship only arrived now and then with something particularly big and juicy, this behaviour suggesting that he expected an admiring audience to applaud him for his skill and bravery, the ladies having been very busy collecting smaller insects and moths. One of them seemed to be particularly keen on a little pale green triangular moth.

The nests are all close to the ground, generally in thick grass or rubbish, and very well camouflaged. It is impossible to see the opening until you see the little bird go in. The casualty rate of these little birds in the nests is very high. Two out of three of the little Red-backed Wrens' nests that we watched this year were destroyed. The eggs are tiny, not much larger than a cherry stone, but on their enforced protein diet the little birds grow to full size — except for the tail, which is stumpy — in about twelve days, but the parents go on feeding them for some time.

The parent birds are meticulous in the way they keep the nest clean, and you would see one or the other of them come out of the nest, holding in his or her beak what looked like a bag of dirty washing. These are really the babies' droppings cunningly passed in a mucous sack. This is never dropped near the nest in case it should catch the eye of an enemy, but is carried away and never deposited within thirty to forty yards of the nest.

In approaching the nest, the parent bird never goes straight to the opening, but comes indirectly through neighbouring bushes. When it gets reasonably close, it has a good look around to see if everything is safe, hops down to an adjacent perch near the mouth of the nest, has one quick look generally at me, slides into the nest and disappears. This makes it reasonably easy to photograph. We break off the surrounding branches which might act as perches, put a perch in a suitable place for him to land, then the tripod is put about three feet away. Focus a camera with a Compur shutter on the perch, with a flashlight, fix a long plastic release on to the camera, take the release, say about twenty feet away, sit in a comfortable light chair and be prepared to enjoy a couple of hours of hunting!

THE other 35 mm. camera I use has a special easy focusing twelve inch lens, with a unipod and a very fast colour film. This enables me to act in most lights at 1/200 of a second. With the set camera I use 1/250 of a second. I mainly use the telephoto lens now for birds that are feeding where I cannot fix the camera, such as in the case of Honeyeaters.

Birds in the wilds may be more timid, but those close to civilization are unbelievably trusting. The first

Variegated Wren, male (right) and female (Malurus lamberti).

Photo: Barry and Joanna Morgan

time I set the tripod up close to the nest of a Blue Wren, I had hardly got seated on my chair before he arrived back with his food and perched on the leg of the tripod before going into the nest. It was astonishing.

It is only owing to my friendship with Tom Leahy, his wife and three sons that I have been able to accomplish this. They live on the outskirts of Brisbane in a district not yet heavily built over, and are bird lovers and expert bird watchers. It is only owing to their skill and perseverance that I have had such wonderful opportunities these last few years.

Although the dainty Wrens are perhaps my favourites, all the birds in the Bush are well worth watching and photographing. The Jabiru, for instance, the large Australian Stork, is a very shy bird and has to be watched from a distance. You can see him jumping up and down and flapping his enormous wings in the shallow water on the sandbanks. I have seen him do this at odd intervals for several years and wondered what he was doing, until then one year he happened to perform much closer to where I was fishing in a boat. This was at Turkey, an out of the way place near Gladstone. I realized he was doing what we did when we were children on the banks opposite Stradbroke Island.

We used to drive the little fish up into the shallow water and when they tried to escape back into the deep, we would run and splash with our feet making as much commotion as possible. The little fish would get frightened and bury themselves in the sand. As their outlines would be faintly defined, if you looked carefully enough you could pick them up at your leisure. The Jabiru having just as much intelligence as we had, was doing the same.

The little Grebe builds a floating nest on the swamp and when she sits on it, except at very close quarters, it looks like a mass of debris. When disturbed she quickly covers the eggs with rubbish, slides smoothly into the water without any splash, then she reappears twenty to thirty yards away and swims about unconcernedly to attract attention away from the nest.

One day while we were driving up a ridge between two swamps, a black duck flopped down the side of the hill simulating a broken wing and doing her best to get us to follow her at any cost. We went back to where she started from, and there were a dozen beautiful little downy ducklings, striped yellow and black, lying in a line perfectly still and perfectly camouflaged amidst the ground dead leaves and twigs.

She is a big bird with a big tail and wing spread. She is about the size of a small hawk and is a clumsy flyer. She seems to prefer running along the ground to flying. Incidentally, they are often killed by motor cars when they are trying to cross a road in their clumsy manner. However, she completely outwitted me. As soon as she saw I was in position on one side of the nest about thirty yards away, she simply crawled up the other side of the slope and entered the blady grass from the other end. The first time I knew she had been there was when she suddenly flew out.

The next nest was in the reeds in the swamp. From afar we watched their feeding habits and observed that they always landed on the branch of a dead tree, close to their home, before hopping down to the nest itself. So I built a hide about thirty yards away from the dead branch. We watched it for a week from a distance and noted they paid no attention to the hide at all, but carried out their routine feeding. So we decided the time had come to take action.

Tom and I solemnly walked down to the hide; I sat behind the hide and Tom ostentatiously walked away. This is the accepted technique of all skilled bird photographers. Eventually the bird returned with a big mouthful of food. Instead of flying down on to the dead branch, he or she flew to a tree neighbouring the swamp some distance off. Here he sat for ages holding the food in his mouth and having a good look at things. Suddenly he flew straight down to the nest and disappeared in the reeds, giving me no chance at all to take a photograph. The next time he came he was worse. Instead of flying in at all, he landed on the hillside 100 yards away, sneaked around a little gully, entered the reeds the other side of the swamp and disappeared, and was not seen again until he flew out the other end.

Not to be denied our trophy, Tom took the babies out of the nest, put them in the crown of his felt hat and placed the hat at the base of the dead branch where I could see them. Next time the bird came in with the food he was really nonplussed. He sat on a tree and watched everything for at least twenty minutes, but eventually flew down on to the dead branch and gave me plenty of time to take my photograph. We put the babies back in the nest and a week later they were thriving.

The babies are hideous, with shiny black beak, legs and feet and dark skin. They have ugly long string-like rudimentary feathers. Only a fond loving mother would bother to feed them! A fortnight later we went to photograph the babies' progress but they had already left the nest. However, Mick Leahy made the call of the parent

Female Red-backed Wren.
Photo: Barry and Joanna Morgan

bird several times, and the little fellow came out of the edge of the swamp. He was properly feathered then, but not able to fly, of course. We could never find them again.

CAMOUFLAGE plays a big part in the life of birds, especially when nesting. For instance, the Black Swan swimming across the other side of a swamp is very easily picked out by his lovely profile, especially his curved neck. However, when sitting on a floating nest the same distance off, the bird's identity is completely obliterated by the fact that the neck is held absolutely straight and stiff, or with a sharp angular kink in it, making it look like a dead branch of a tree sticking out of the water.

The Mopoke is perhaps the greatest camouflage artist of them all. They are night birds and are very like an owl, especially when their eyes are open. In the daytime they choose a tree whose bark resembles their colouring. When they see you coming, they shut their eyes tight and slowly and stiffly move their head and neck until the whole bird resembles a branch of the tree itself.

A pair of them nested two years in the same fork of the same tree and we were able to watch the babies as they developed. When they were big enough to peep out from under their mother they were easy to see because they had their eyes wide open and stared at us. However, Mumma quickly taught them better. The next time they followed Mumma's directions, shut their eyes and stiffened their heads and necks until there were two stumps.

I managed to get a flashlight photo of them being fed at night. It was magical how quietly the Mother bird could fly in and out through the trees.

As it got dark the only way I could tell she was back and feeding the babies was a deepening of the shadow in the region of the nest where my camera was focused.

We have been amateurish but keen. We have had plenty of fun and lots of interest, and we certainly have some real trophies to show our friends.

MANY mother birds do this sort of thing to draw you away from their babies. I have followed a little Sandpiper on the ocean beach for ages and still not found her nest or babies.

We watched a Spur-winged Plover one morning from a distance of 120 yards in the hope she would lead us to where her babies were hidden, as I wanted to photograph them. We knew they had only hatched out within 24 hours but they had left the nest and we hoped she would lead us to them. Although we were well hidden I kept very quiet. She made no attempt to go to where they were hidden, but stood on a little rise making an obviously warning cluck. She must have been telling the babies to be perfectly still. Eventually we got tired of waiting and went down to see if we could find one. We did find two of them lying absolutely motionless, perfectly camouflaged amidst different coloured stones and so still that ants were crawling over them.

I was very anxious to photograph the beautiful little yellow Robin which generally nests high up in a tree and is difficult for me to get at with my outfit. To my joy this year she nested quite near to the ground. We observed her carefully from a distance, for if you disturb the birds before the eggs are hatched, the parents are liable to leave the nest and not return. The eggs duly hatched but before I could get my photograph the nest was destroyed by some predatory animal — snake, goanna, mopoke, owl, jackass, or even a tame cat gone wild. Who knows! This happened three times in one season. The mortality rate in small birds is terribly high. However, Brian Leahy did get a good picture of the Robin and was kind enough to give me a duplicate.

The little Brown Honeyeater shows an example of wonderful courage. With a set camera three feet from the nest and sitting eighteen feet away, hidden behind a bush, I took a couple of pictures of her as she fed her babies. She showed a lot of timidity in approaching the nest while I was doing this. Suddenly it began to rain softly. The babies were very young and unfledged. I hurried to protect my camera and while I was standing only three feet from the nest, the little mother came flying back and without the slightest hesitation flew down on to the nest to cover her babes. She crouched down as low as she could and looked up at me with fearful pleading eyes as if to say, 'You won't hurt me, will you?' We left her alone.

The Cuckoos lay their egg — I believe only one — in other birds' nests and expect the other bird to hatch and raise their baby for them, and this is what the other bird rather foolishly does. It hatches the Cuckoo's egg at the expense of its own babies, which are ruthlessly pushed out of the nest as the Cuckoo grows bigger.

This brutal act I actually witnessed the other day. A small Bronze Cuckoo loves to lay its eggs in the beautiful hanging nest of the Australian Bush Canary. This lovely nest has only a small entrance high up on the side, much too small for a Cuckoo to enter. Scientists wonder how the Cuckoo ever achieves its object. Funnily enough a friend of mine, Alf Thurlow, almost certainly saw the bird in the very act of depositing the egg. As a boy he was a great bird watcher, and at one stage was watching the nest of a little Bush Canary. For two days in succession there was a small egg laid. On the third day, just as he reached the nest, there was a Bronze Cuckoo hanging on the nest over the entrance with its body quivering. When the bird left he investigated the nest and found a third egg considerably larger than the other two.

The nest I photographed the other day showed me the horrible sequel to all this. The little Canary mother approached the nest to feed her young and when she left I was horrified to see one of her babies fall out and hang by the claws to the outside of the nest. I told my friend about it and he got a ladder and put the baby Canary back safely. He rang up next day to say the two Canary babies were dead on the ground under the nest. I told him to investigate and sure enough there was a fat, baby Cuckoo alone in the nest. The Cuckoo had won.

AMONGST our bird life the Coucal or Swamp Pheasant is unique. It is the only Cuckoo in Australia which builds its own nest and hatches and rears its own young. They build somewhere near water on the ground, either in a patch of blady grass in a neighbouring field or in the reeds at the edge of a swamp. The first nest we found was in a field and I thought I'd get a lovely picture of her flying in to the nest as she always did when we watched her from afar.

Australia's Wonderful Trees

By Edna Walling

IT is customary amongst bush folk in Australia to group the Eucalypts according to the bark under the various headings of Box, Ironbarks, Stringybark, Bloodwoods and Gums. This grouping is still a favourite one in spite of the fact that in different parts of its habitat the same tree may have a somewhat different type of bark, making it necessary to rely upon examination of buds, flowers and fruit for certainty of identification.

In the Gum group, which has smooth bark, is a species which is to some people the arboreal symbol of Australia — the River Red Gum. It is a magnificent tree that follows the water wherever it is found in inland Australia, even in the far north, though here it is not such a large spreading tree as in the south. The timber is red and of great durability. The scientific name is *Eucalyptus camaldulensis.*

Near Sydney 'Red Gum' is a lovely tree that grows in the sandstone gullies around the harbour. The way this tree sends out buttresses among the loose rocks is a noticeable characteristic of this beautiful 'gum'. It has very smooth pinkish-grey and sometimes bluish bark. A copious flow of red gum or kino gives the tree the common name of Red gum. It is not a Eucalypt at all but an *Angophora,* which is a closely related genus with opposite leaves — not alternate as in Eucalypts. It is known by several other common names — Apple, Apple gum, Gum myrtle for instance. It is one of the most picturesque trees of the continent.

The Sydney Blue gum is a true Eucalypt (*E. saligna*) and is called Flooded gum in Queensland. Apart from being a beautiful tree, it provides one of our best timbers. In the forest it is a tall smooth tree with a bluish-grey bark, but when growing in the open, the crown is spreading. It is interesting to read in the late David Stead's immortal little tree book that of all the Eucalypts grown in South Africa the Sydney Blue gum has made the fastest growth. This tree is not to be confused with the Tasmanian Blue gum; that so many Eucalypts are commonly called Blue gums leads to much confusion.

WE turn now to a very striking group — the Ironbarks. The deep corrugations of the bark are black in most of the species, and the timber dark red and hard, like mahogany. They are found from Queensland through New South Wales into northern Victoria, often on dry gravelly ridges. One of the 'Ironbarks' with a smooth white bark is grouped with the Ironbarks on account of the shape of the seed capsules. In the identification of Eucalypts, the botanist may also require flowerbuds and mature and juvenile leaves, although some species can be identified by fruit and bark alone.

Growing in damper soils is the lovely silver-trunked Belbowrie Tea-tree, or Paperbark. This is one of the largest of the Melaleucas. It is a truly magnificent sight when the whiteness of the papery bark stands out in contrast against the dark trunks of Swamp mahogany, or leans picturesquely over some river or swamp. Growing crowded in swamps near the sea, the trees are somewhat thin and spindly, but where they are able to develop into trunks of considerable dimensions the sight of them is breathtaking. At first sight they look just like Gum trees until you see how thin and spongy the bark is. Whilst we stood aghast watching some beautiful specimens being chopped down at Swansea in New South Wales, we picked up some large chips of bark and marvelled at the layer upon layer of thin paper, amounting to well over an inch in thickness.

Ironbarks. Photo: Edna Walling

The Leopard Tree grows on certain soils of the western plains. Here again is a tree with bark that is such a striking feature of the landscape. The Leopard Tree thrives in a rainfall as low as seven inches and reaches about thirty feet in height. The strange thing about it is that it starts life as an ungainly, sprawling, prickly bush. In time one stem in the middle begins to grow, emerging as a single trunk. This bush-like habit protects the infant tree from grazing and destruction by animals. The branches are slightly greyish and are thin, slender and somewhat pendulous so that in a slight wind they sway gracefully, giving the trees a wraith-like appearance. Leopard trees (*Flindersia maculosa*) belong to the same genus as 'Native Teak', the timber used for the decks of ships because nails do not rust in it. The same genus also contains the prize cabinet woods Queensland Maple and Silver Ash. Leopard-wood timber closely resembles English Box.

AMONG the many Casuarinas or Sheoaks, the Horse-tail Sheoak (*C. equisetifolia*) is one of the most beautiful, with long pendulous branches and mane-like masses of 'needles' which function as leaves. It is fairly common along the coasts of north Queensland and some of the islands farther north. The adjective 'She' is said to be derived from the peculiar sound produced by the wind when passing through the thin branches. Another reason, less popular, is that it is because the wood is inferior to Oak! However, there is also a Bull Oak (*C. luehmanii*) in the west!

The Eucalypts that come under the heading of 'Box' are many: Red Box, Grey Box, Bimble Box, Yellow Box. The Yellow Box, one of the most widely known, is widespread in eastern Australia. It grows into a magnificent tree, producing not only one of the best of firewoods, but with blossoms that apiarists favour very highly for honey. All the Boxes are good honey-yielders but Yellow Box is particularly so. It has been seriously asserted that in Yellow Box country the value of the honey per acre would be much higher than that of wool or beef! Sometimes the tree has a shaggy and brownish-black bark half way up the trunk, and smooth white bark covering the small branches of the head; but just as frequently the bark will be like closely woven tweed. The leaves are always comparatively small and narrow, and a greyish-green colour.

In moist, cool mountain areas the Myrtle Beech is found. The native Beeches of Australia reach 100-120 feet in height under favourable conditions. In the south, the species that grows on the sides of mountains in Victoria and Tasmania is called Antarctic Beech or Myrtle (*Nothofagus cunninghamii*). The heads of these lovely trees have lacy branches that are decked with moss and tiny glistening dark green leaves. The age of the stunted Antarctic Beeches (*N. moorei*) of Lamington Plateau in Queensland has been guessed at between 2,000 and 3,000 years.

TREE-LOVING visitors to Australia will find a bewildering number of tree species in Queensland rainforests which are popularly alluded to as 'Scrub', 'Vine Scrub' or 'Jungle', in contrast to 'Forest' (*Eucalypts*). Fortunately the Queensland Government has had the foresight to reserve some rainforest areas as National Parks where one may walk along graded tracks beside magnificent straight trunks and spreading buttressed roots.

Though one may at first be conscious of a monotony in the grey foliage of Eucalypts, actually there is a rich variety of greens amongst Australian trees. The velvety black-green of the Murray Pines, the rich deep green of the Blackwoods and some other Wattles, the bronze green of the Mahogany gums, and the silvery grey of the Narrow-leaf Ironbark all make the texture of our landscapes beautiful and variable.

Then the form or habit of Gum trees can be so different, from the tall, slender Mountain Ash to the squat and stool-like Mallee gums.

Anyone taking the trouble to become acquainted with the trees of Australia will soon discover that we live in a land of beautiful, valuable and interesting forests dominated by over five hundred species of Eucalypts which are unique in the world.

Red Stringybarks. Photo: Edna Walling

Broadleaf Tea Tree.
Photo: Edna Walling

Gwen Atkinson's Diary

14th February: Returning from our holidays in Sydney, we drove through New England where for many miles the road was bordered with wildflowers. They made a beautiful display of colour, yellow and white flowers being by far the most numerous, but there were many patches of blue and pink and occasionally blocks of deep purple. These inland flowers may not be as spectacular individually as Waratahs, Christmas Bells and other well-known coastal flowers, but they certainly make a more colourful display, being massed in so many thousands in this park-like country.

Photo: Daily Mirror, London

Red Dingo.

Scenes such as this make one glad that the indiscriminate use of poison sprays to destroy roadside growth which Rachel Carson describes in her book 'Silent Spring' is not practised here.

An interesting book which puts in a plea for the conservation of the native trees and plants along our roads is 'The Australian Roadside' by Edna Walling. This book points out the beauty and interest to be found in the Australian countryside, and the pleasure of driving along roads bordered with the natural trees and flowers. Trees planted after these have been destroyed can never have the same appeal as the native trees which are characteristic of the district. Miss Walling finishes her book with the remark that 'The roadside is the Front Garden of the Nation'. New England certainly played its part in making Australia's front garden charming this summer!

16th February: At home (near Goondiwindi) it was still very hot. Large flocks of White Cockatoos went screeching over the house in the early mornings and the familiar birds were about the garden, the gaily coloured Pale-headed Rosellas (but none of the Eastern Rosellas whose brilliant colours we had glimpsed in the colder country), Crimson-winged Parrots, Red-backed Parrots and all the little birds we are used to. The Galahs were still playing their old evening game in the poplar tree — one long twig sticks out at the very top of the poplar tree and here the Galahs love to perch, swaying and balancing in the wind as if showing off to an audience, noisily taking it in turns to perform.

27th February: This was a sultry, stormy day, and in the evening when we were gardening, a flock of Rainbow-birds came swooping overhead; they dived down low, only a few feet above our heads, making their strange noise — keer, keer, keer — and circled around for some time, the evening light shining through their bronze coloured wings. For some days after this the Rainbow-birds were always about and one stormy evening we noticed them flying with a flock of White-breasted Wood-swallows and

a few White-browed Woodswallows. Higher up was a flock of Spine-tailed Swifts and the sky semed to be full of moving birds. The Rainbow-birds were about for a week or two after this, but I have not seen any for some time now, so they must have all gone north to their winter homes.

1st March: There was a terrific storm at dusk; over an inch of rain fell in about a quarter of an hour and this was accompanied by very fierce winds which uprooted big trees and littered the paddock with leaves and branches. Soon after it was over we heard the creek coming down, and next morning it was full and running for the first time for many months. Soon the air was full of the loud croaking of frogs. It always seems strange that the frogs' voices can be heard so soon after the water appears in the creek, after so many months of silence. I suppose they are the sort of frogs described by H. A. Lindsay in *The Bushman's Handbook,* although, knowing nothing about frogs, I am not sure. Mr. Lindsay says that when a swamp or lagoon is drying up the frogs 'distend themselves with water, burrow into the mud, wriggle around until they have made neat little cells in the clay and there hibernate until the next flood rain. When the water percolates to where they have been dormant for months or even years they burrow through the softened clay and as soon as dusk falls fill the air with their ringing chorus of croaking'. It certainly seems a very confined life! Lindsay describes how a thirsty man may dig these frogs out and drink the water stored in their bodies. The water birds were not long in discovering the water in the creek, White-necked Cranes, Cormorants and a little Diver appearing within the next few days.

6th March: Coming home through the paddocks in the evening, we saw numerous Kangaroos, one Red-necked Wallaby, one Swamp Wallaby, one Blue-tongued Lizard, and at Dingo Creek — one big red Dingo! We also saw a family of five half-grown Emus.

8th March: A paragraph in the Sydney paper told of two members of the Embroiderers' Guild of New South Wales who are working on a book dealing with the embroidery of Australian native flowers. What a wonderful idea! Our native flowers and birds should be used much more in our arts and crafts, and embroidery, if delicately done, should be a perfect medium for them. Perhaps the authors of this book will undertake one on the embroidery of our native birds next. The difficulty would be to find silks and cottons bright enough to work some of them. For instance, the blue of the little Blue-and-White Wren is quite 'out of this world'. We have seen several of these beautiful little birds since I first wrote about them. Among the salt bush where we saw the first one we later saw three, and another one has been seen among lime bushes some miles away from the others.

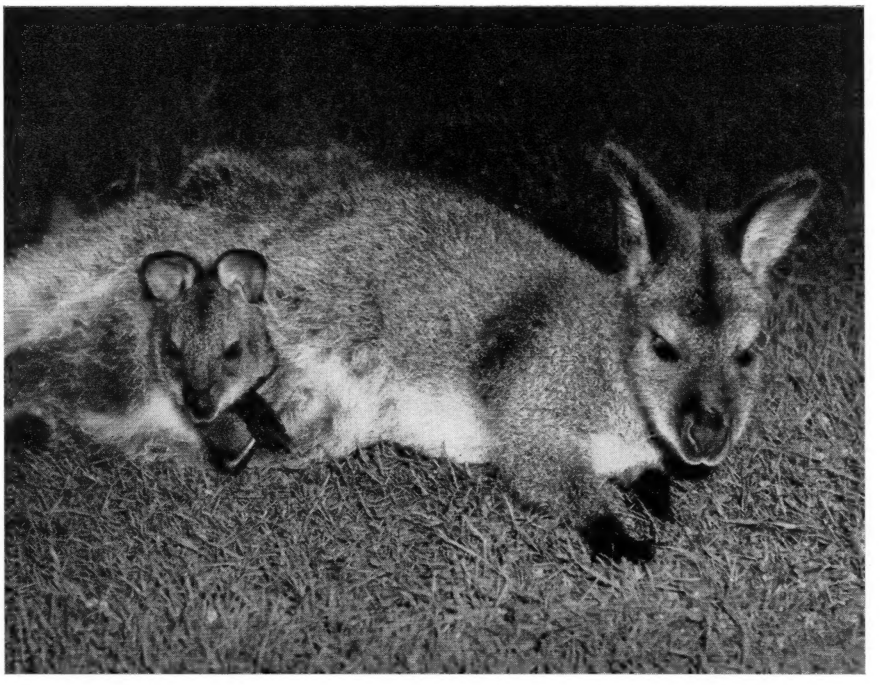


Photo: Don Stephens

Red-necked Wallaby with young.

18th April: We found a Spotted Bowerbird's playground. It was in a thick patch of lime bushes and was built on the bare ground between the prickly bushes. Dry grass was stuck into the woven structure of sticks and the little bower formed. On the small platform in front of the bower was an assortment of coloured glass and other articles, a larger collection at the back consisting mostly of small bleached bones, but also including pieces of wire, a roofing nail, cartridge cases and smooth stones. A small heap actually in the bower was mostly coloured glass, including one quite big piece, which was part of the neck of a bottle, and which must have been a very heavy, awkward load for the bird to carry. Many little footmarks about the bower showed that it is still in use. There was an old bower close by partly broken down and apparently no longer in use.

25th April: We drove to the Bunya Mountains near Dalby. In the beautiful rain forests on the mountains we saw many birds which were strange to us and full of interest. Our time was all too short and we found it difficult to see the birds clearly so dense was the foliage, so that we could not identify many. However, we did see several Green Catbirds. We heard their strange calls first and could not believe the noise was made by birds. It was the noise made by cats at night and sounded so strange in the silence of the forest. The first call was answered by others from different directions and then the birds appeared and settled on a tall palm which seemed to have some sort of fruit on top of it which the birds were eating. We also saw two Scrub Turkeys. One sat for a long time on a low branch watching us with his beady eye in his little red head, the yellow on his neck being clearly seen. Big reddish-brown pigeons with long tails, we decided were Brown Pigeons or Pheasant Pigeons. At dusk the musical call of the Currawongs was followed by the clear whistle of the Whipbird repeated

BILL JONES ANSWERS YOU

Dear Mr. Jones,

Why does a beetle when you push it under water and hold it there for a while still live when you take it out? I have noticed that bubbles form on its back.

Yours sincerely,

ANTHONY WEBB,

Brisbane.

Dear Anthony,

Thank you for your interesting observation on beetles. Because of the unique different breathing system and their ability to trap bubbles of air in breathing passages on the underside of their bodies, most beetles would be able to survive short periods of 'ducking'. However, when the air supply became exhausted the beetle would soon drown. The bubbles you saw forming on its back probably came from some of the trapped air escaping from its breathing system.

Dear Sir,

I am enclosing a rough sketch of an insect my nine-year-old son caught on our blue buddleia bush over the latter part of November. However, I notice that it is back again this month. It moves very fast and took many days to catch—we would like to know as much as you can tell us about it as we had never seen one like it before.

Christopher is very interested in the insects, etc., we have around us and reads *Wildlife* from cover to cover.

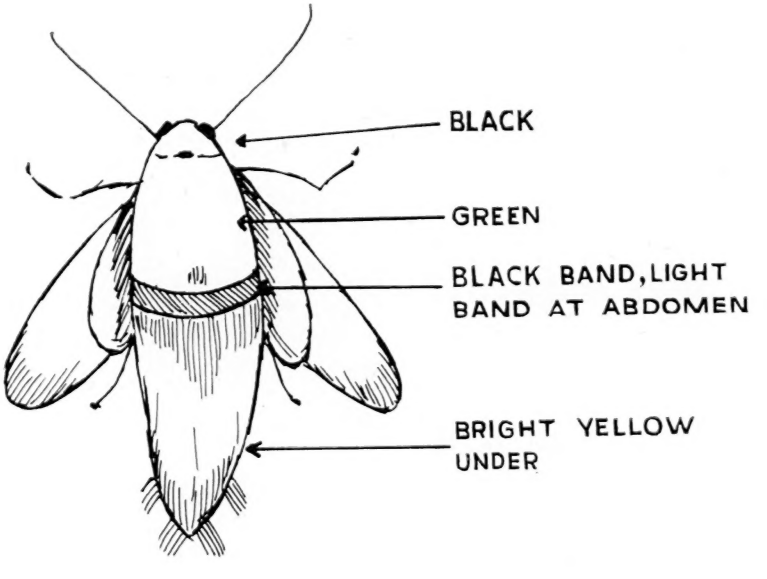
Yours faithfully,

(Mrs.) WENDY JONES.

Monto, Queensland.

Dear Christopher,

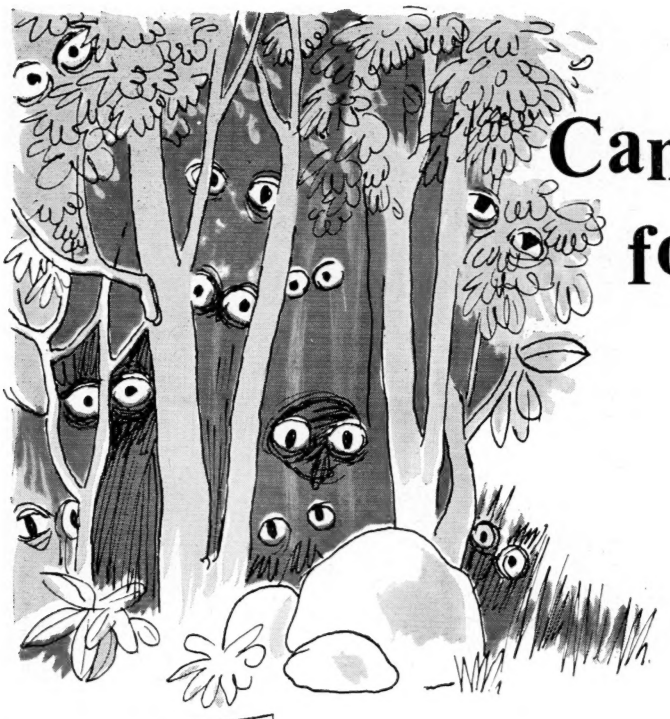
The colourful moth so nicely sketched and described in your mother's letter is the Hawk moth or Bee moth (Cephenodes kingii). It is one of the day flying moths and is often called Bee moth because of its resemblance in colour and markings to a large Bumble bee. This moth is very rapid in flight and may often be seen hovering over plants and extending its long proboscis into the flowers. It is known from New South Wales to North Australia.



GWEN ATKINSON'S DIARY *continued*

several times; then the Mopoke called from the forest, the music of nightfall on the mountains being quite different to that which we hear at home.

8th May: We saw two Bush Curlews; they remained standing motionless under a tree for some time while we watched. These birds are not often seen here, although we recently saw one at night as we drove home through Forestry country. It was on the road and spread its wings, showing the markings clearly in the beam of the headlights as it flew off. A Plain Turkey (Bustard) was also seen the other day in one of the crop paddocks.



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Notes on Contributors

SAM CARRUTHERS

is a member of the R.A.O.U. and the Bird Banders' Association. At present he is Research and Co-ordination Controller with Mount Isa Mines Ltd. He has travelled widely over north Queensland and the eastern section of the Northern Territory.

PETER DWYER

is a Reserve Bank Scholar at the Zoology Department of the University of New England. He is currently completing a doctoral thesis on the population ecology and social organization of some Australian bats.

LLOYD NIELSEN

is a member of the R.A.O.U., a licensed C.S.I.R.O. bird-bander, and belongs to several other natural history organizations. His particular interest is ornithology and he was the first to prove definitely by a specimen sent to the Queensland Museum that the White-backed Magpie was to be found in Queensland.

DR. ARTHUR STANLEY ROE

was born in Queensland in 1885. He was the first Rhodes Scholar from Queensland, returning from Oxford in 1913. Always a nature-lover, since his retirement from medicine he has devoted a great deal of time to photographing birds and wildflowers.

HUGH SADDLER

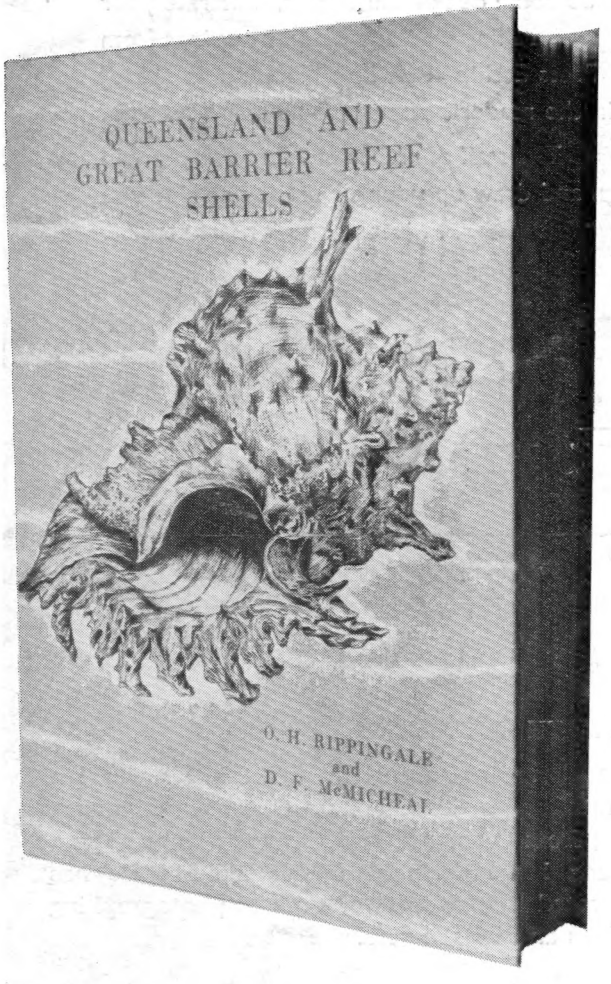
is a third year Science student at the University of Adelaide, studying Physics and Botany. Through his interest in bushwalking he has seen many of the more interesting areas in South Australia on foot and has also visited parts of Victoria and New South Wales.

EDNA WALLING

is a well-known landscape consultant and through her work visits country places where she is able to photograph trees. Together with Joan Niemand, she compiled a tree-guide for motorists in Australia.

QUEENSLAND AND GREAT BARRIER REEF SHELLS

BY D. F. McMICHAEL AND O. H. RIPPINGALE



In the protected tropic waters of Queensland's Great Barrief Reef marine life abounds in all its forms. Dr. McMichael, Curator of Shells at the Australian Museum, describes the various classes of shells to be found here, and tells us something of the animals which inhabit them. He explains for the beginner the system of classification, how scientific names are chosen, how to clean shells, and how to start and arrange a shell collection.

The illustrations, twenty-nine plates depicting in full colour about six hundred different shells, are the work of the talented water-colourist and keen conchologist, Mr. O. H. Rippingale.

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